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China Report

AGRICULTURE

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26 November 1985

CHINA REPORT

AGRICULTURE

CONTENTS

PEOPLE'S REPUBLIC OF CHINA

NATIONAL

More Foreign Funds To Be Used for Agriculture (XINHUA, 23 Oct 85).....	1
Asia's Largest Germ Plasma Storage Center Built in Peking (BEIJING RIBAO, 17 Oct 85).....	2
Peasants' Living Standards Continue To Rise (XINHUA, 6 Nov 85).....	3
Yunnan Concludes Work Meeting on Public Security Work in Forestry (Yunnan Provincial Service, 2 Nov 84).....	4
Progress Reported in Controlling Soil Erosion (XINHUA, 28 Oct 85).....	6
Progress Reported in Animal Laboratory Research (XINHUA, 24 Oct 85).....	7
New Paths for Rural Economic Development Discussed (Miao Fuchun; JINGJI RIBAO, 8 Aug 85).....	8
Foreign Trade in Farm Produce Discussed (Gao Hongbin, et al.; JINGJI RIBAO, 8 Aug 85).....	12
Issues in Farm Technology Transfer Discussed (Du Songnian, Liu Yuejin; JINGJI RIBAO, 8 Aug 85).....	14
China's 35-Year Achievements in Water Conservancy (XIANDAI ZHONGGUO SHUILI JIANSHE, Sep 84).....	16

Briefs	
China-Sweden Dairy Training Center	72
Increase in Farm Machinery	72
National Orange Output Reported	73
Plant-Breeding Symposium Concludes	73
New Rice Cultivation Technique	73
TRANSPROVINCIAL AFFAIRS	
Gansu Hosts State Council Meeting on Agriculture	
(Gansu Provincial Service, 17 Oct 85).....	74
State Council Meeting on Agriculture Ends 24 Oct	
(Gansu Provincial Service, 24 Oct 85).....	75
Briefs	
Huang He Forest Belt	77
Rainy Season Afforestation Tasks	77
ANHUI	
Circular on Autumn Harvesting, Sowing	
(Anhui Provincial Service, 26 Oct 85).....	78
Briefs	
Cotton Exports	80
BEIJING	
City Works To Ensure Winter Vegetable Supply	
(XINHUA, 2 Nov 85).....	81
Beijing Mayor Urges More Milk Production	
(XINHUA, 16 Oct 85).....	83
Regulations Protecting Beijing Forest Promulgated	
(BEIJING RIBAO, 11 Aug 85).....	85
FUJIAN	
Governor Discusses Grain Production	
(ZHONGGUO XINWEN SHE, 22 Oct 85).....	91
Deregulation of Hog Prices Discussed	
(Wu Liangcan; FUJIAN LUNTAN, No 6, 1985).....	92
Rural Fujian Boosts Production for Export	
(XINHUA, 28 Oct 85).....	97

GANSU

- Gansu Makes Progress in Controlling Soil Erosion
(XINHUA, 12 Oct 85)..... 99

GUANGDONG

Briefs

- Summer Grain Quotas Overfulfilled 100
Hainan Restores Agricultural Production 100
Guangdong Special Zone Agriculture 100

GUANGXI

- Circular on Winter Farmwork Issued
(Guangxi Regional Service, 24 Oct 85)..... 101

- Guangxi Holds Conferences on Importance of Winter Farming
(Guangxi Regional Service, 14 Oct 85)..... 102

Briefs

- Guangxi Fruit Harvest 102

GUIZHOU

- Meeting Held on Fulfilling Autumn Sowing Plan
(Guizhou Provincial Service, 23 Oct 85)..... 104

HEBEI

- Hebei Forestry Production in Sixth 5-Year Plan
(HEBEI RIBAO, 3 Oct 85)..... 105

Briefs

- Peasant Income Increase 107

HEILONGJIANG

- Commentary Views Grain Production
(Heilongjiang Provincial Service, 28 Oct 85)..... 108

Briefs

- Heilongjiang Cattle Raising 109
Grain Output 109

HENAN

- Peasants Adopt Energy-Saving Measures
(XINHUA, 1 Nov 84)..... 110

	Briefs		
	Henan Autumn Farmwork		111
HUBEI			
	Briefs		
	1985 Grain Output Record		112
HUNAN			
	Hunan Reports Irrational Impositions on Peasants (Hunan Provincial Service, 3 Nov 85).....		113
	Briefs		
	Peasants Earn More Income		114
JIANGSU			
	Government Urges Rush Reaping, Planting (Jiangsu Provincial Service, 25 Oct 85).....		115
	Briefs		
	Jiangsu Artificial Crab Breeding		116
	Fish-Breeding Areas Developed		116
JIANGXI			
	Circular on Fall Crop Procurement Issues (Jiangxi Provincial Service, 22 Oct 85).....		117
	Jiangxi Results in Fighting Soil Erosion Noted (XINHUA, 7 Nov 85).....		118
	Briefs		
	Summer Grain Purchase		119
	State Farms		119
JILIN			
	Farmers Study Agricultural Sciences (XINHUA, 25 Oct 85).....		120
SHAANXI			
	New Method Halts Soil Erosion on Loess Highlands (XINHUA, 4 Nov 85).....		121
	Briefs		
	Peanut Output		123
	Shaanxi Afforestation Plan		123

SHANDONG

Briefs

- Trade Talks Meeting 124

SHANXI

- Ways of Improving Grain Conversion, Reducing Glut Discussed
(Huang Jiasheng; NONGYE JISHU JINGJI, No 4, Apr 85)..... 125

SICHUAN

- Province Experiments With Ecological Farm System
(XINHUA, 2 Nov 85)..... 130

XINJIANG

Briefs

- Cold Springs Found 131
Xinjiang Afforestation Feats 131

YUNNAN

- Small Ethnic Group in Province Prospers
(XINHUA, 1 Nov 85)..... 132

ZHEJIANG

- Peasants Get New, Improved Homes
(XINHUA, 30 Oct 85)..... 133

- Development of Feed Industry in Zhejiang Examined
(Huang Yong; JINGJI DILI, No 3, Aug 85)..... 135

Briefs

- Circular on Harvest Storage Space 145

ABSTRACTS

PLANT PATHOLOGY

- ZHIWU BAOHU XUEBAO [ACTA PHYTOPHYLLACICA SINICA] No 2, Jun 85..... 146

NATIONAL

MORE FOREIGN FUNDS TO BE USED FOR AGRICULTURE

OW231111 Beijing XINHUA in English 0806 GMT 23 Oct 85

[Text] Beijing, October 23 (XINHUA)--China plans to use 50 percent more foreign funds in agriculture during the Seventh Five-year plan period (1986-1990) than from 1981 to 1985, the People's Daily reports today.

Over the past five years, the Ministry of Agriculture, Animal Husbandry and Fisheries signed agreements on sino-foreign cooperation projects involving 670 million yuan of foreign investment. Plus those of provinces, municipalities and autonomous regions, the total amount has come to 1.12 billion yuan.

The funds will be used to develop centers producing export commodities, animal husbandry, aquatic products, food and feed processing industries, and traditional, famous or new products and update export-oriented rural factories. The funds will be used also in agricultural research and education and agrotechnique popularization.

Other projects to use foreign funds and technology will include red and yellow soil improvement, city freshwater fish raising, wasteland reclamation in the Xinjiang Uygur autonomous region, milk production, development of poor areas, polders on the coast, and coastal open cities.

The country hopes that these projects will help reach the goal of quadrupling agricultural output value by the turn of the century and improve the rural economic structure.

The ministry has connections with more than 80 countries and regions and implemented 101 economic and technical cooperation projects, including improvement of alkaline soil on the North China plain, rubber tree plantation in Guangdong province and milk production in six big cities.

/12624

CSO: 4020/49

NATIONAL

ASIA'S LARGEST GERM PLASMA STORAGE CENTER BUILT IN PEKING

SK010217 Beijing BEIJING RIBAO in Chinese 17 Oct 85 p 1

[Text] After 14 months of concentrated construction, the groundwork of the national crop germ plasma resources storage center has been basically completed. Located outside the south gate of the Haidian District agroscientific institute, this center will be the biggest germ plasma resources storage center in Asia.

"Germ plasma" is the genetic factor of crops. This center is being built to preserve and to research on the fine species of crops. In the past, our country generally preserved the seeds of crops through the backward method of growing seeds in rotation year after year. This has not only caused a waste in human and material resources, but also made the pollens get mixed up and the species degenerated. In the case of serious natural calamities, the species of crops were faced with the danger of becoming extinct. Being extremely rich in crop resources, our country is one of the species centers in the world. The completion of this center will be conducive to preserving and researching the utilization of the rich crop resources of our country. The newly built center will store up germ plasma resources through the methods of low temperature, low humidity, vacuum storage. The center is composed of three parts -- the experiment building, the seed processing zone, and the storage house. After its completion, more than 400,000 kinds of seeds can be stored at this center. This center is being built by the Haidian District No 2 Construction Company with a joint design of China and the United States.

/12640
CSO: 4007/69

NATIONAL

PEASANTS' LIVING STANDARDS CONTINUE TO RISE

OW062100 Beijing XINHUA in English 1503 GMT 6 Nov 85

/Text/ Beijing, 6 Nov (XINHUA)--Peasants are shifting their attention to building houses and purchasing durable goods, now that most of them are able to produce more than enough to feed and clothe themselves.

About half of the peasant households have built new houses over the past 7 years. The living space per person in the countryside averages 13.6 square meters, much more than the figure for urban residents.

In a release available to XINHUA today, the State Statistical Bureau estimates that peasants would spend more money on housing building, mid-to-low-priced durable goods and mid-to-high-priced synthetic fiber materials and ready-made clothes.

The release describes this as an indicator of the rising living standards of the Chinese peasantry under the new policies of encouraging rural prosperity.

Peasant living expenditures per capita this year will reach 300 yuan, compared to 273 yuan last year which was 2.4 times the 1978 figure.

Clothes and other daily necessities were made by peasants themselves in the past, but now 97 percent of these are purchased.

Between 1978 and 1984, the proportion of rice and wheat flour in the daily diet of peasants increased from 49.4 percent to 74.9 percent, and the amount of meat, edible oils, eggs, fish and poultry went up as well.

Ready-made clothes of synthetic fibers are replacing cotton clothes and more and electrical appliances are found in better-off rural households, the release says.

But the increase in peasant income has varied according to location and circumstances, says the release.

/12228

CSO: 4020/76

NATIONAL

YUNNAN CONCLUDES WORK MEETING ON PUBLIC SECURITY WORK IN FORESTRY

HK041532 Kunming Yunnan Provincial Service in Mandarin 1100 GMT 2 Nov 85

[Text] The 6-day national work meeting on public security in forestry, which was sponsored by the Ministry of Forestry and the Ministry of Public Security, concluded today in Kunming.

The meeting emphatically studied measures for strengthening the public security work in forestry, protecting natural resources in mountainous areas and maintaining public order in forest areas under the new circumstances.

The meeting pointed out: To protect forests and develop forestry is a strategic task of China's four modernizations, as well as the prominent public security task in forestry. With the efforts of public security departments over the past years, the public order of forest areas has remarkably changed for the better. Both the rate of crimes and the number of forest fire cases were reduced. However, in the wake of reforms and the policy of opening up, there are new situations and new problems have developed in the forest areas. The prominent ones are that some criminals take advantage of reforming forestry but arbitrarily chop trees, trade in timber without permission and practice speculation; so that some forests are seriously damaged and the losses caused by forest fires remains very great. The situation of reclaiming land by arbitrarily destroying forests is yet to be completely checked.

The meeting urged forestry and public security departments in various areas to strengthen their leadership; to improve the setup and ideological building of public security teams in forest areas; to heighten the policy understanding and professional skills of cadres; and to closely cooperate with the departments concerned so as to publicize and implement the law of forests. They should resolutely act according to the law and strive to maintain the public order of forest areas in an all-round way. They should encourage and organize the masses to help the forestry and public security organs to struggle against various crimes of damaging the natural resources. They should mobilize the masses to take preventive measures against forest fire, and check the unhealthy tendency of arbitrarily chopping trees.

In the course of the meeting, responsible comrades of the Ministry of Forestry and the Ministry of Public Security spoke on problems concerning strengthening the public security work in forestry. Liu Kun, deputy secretary of the leading

party group of the Ministry of Forestry and vice minister of forestry, made the summary speech. Some 12 units, including Heilongjiang provincial headquarters for public security work in forestry and Yunnan provincial public security department, exchanged experiences at the meeting.

/12228

CSO: 4007/81

NATIONAL

PROGRESS REPORTED IN CONTROLLING SOIL EROSION

OW280739 Beijing XINHUA in English 0635 GMT 28 Oct 85

[Text] Beijing, October 28 (XINHUA)--People in China's eight water and soil conservation construction zones have brought soil erosion on 8,000 square kilometers under control over the past three years, according to the national group for coordinating water loss and soil erosion control work.

The area equals half the total from 1948 to 1981.

Located in valleys of the Yellow, Liaohe, Haihe and Yangtze rivers, the zones cover 29,000 square kilometers, over two-thirds of which suffer from serious water loss and soil erosion. They were designated for improvement at a national meeting in 1982.

Local authorities contracted more than 900 gullies to peasant households for improvement. By September this year, 753,000 hectares of trees and grass had been planted, 50,000 hectares of farmland improved and a number of water and soil conservation projects built.

Farming, forestry, animal husbandry, medicinal herb centers as well as orchards have been set up in the zones.

The state invested 100 million yuan in the program over the past three years. It plans to complete it in 10 years.

/12624

CSO: 4020/49

NATIONAL

PROGRESS REPORTED IN ANIMAL LABORATORY RESEARCH

OW241138 Beijing XINHUA in English 1120 GMT 24 Oct 85

[Text] Beijing, October 24 (XINHUA) --China has made considerable progress in animal laboratory research and development in recent years, Yang Jun, advisor to the State Science and Technology Commission, said here today.

Addressing the opening session of the second national meeting on animal laboratory research, Yang said Chinese scientists had developed three new strains of mice, which could be used in research into blood diseases and cancers.

China now has more than 600 scientists working in animal research. A primate laboratory has been established at Xishuangbanna, Yunnan province. Several medical and agricultural colleges also have their own animal laboratories or similar facilities.

Over the past three years, the public health ministry has allocated 15 million yuan for building laboratories covering a floor space of nearly 40,000 square meters.

Yang said China planned to build three national animal laboratory centers in Beijing, Shanghai and Tianjin, and to import foreign technology and equipment for them.

He said laboratory animals were widely used in biological and medical research, and were also important to such departments as agriculture, animal husbandry, fishery, space research, the chemical and pharmaceutical industries, family planning and environmental protection.

To catch up with the developed world in this work, China would legislate on animal laboratory management, perfect monitoring and testing techniques, and develop new animal strains.

At the same time, cooperation and information exchange with other countries would be expanded.

The week-long meeting, sponsored by the State Science and Technology Commission, is being attended by 120 scientists from all over China. Participants will discuss animal laboratory research projects planned for the next five years.

NATIONAL

NEW PATHS FOR RURAL ECONOMIC DEVELOPMENT DISCUSSED

Beijing JINGJI RIBAO in Chinese 8 Aug 85 p 3

[Article by Miao Fuchun [5379 1788 2504]: "China Needs To Bring New Development to Its Rural Economy"]

[Text] The Chinese countryside is now in a period of transition in its rapid advance from traditional to modern agriculture. In order to complete this historic transition we must bring new development to the rural economy. We must make painstaking efforts over a fairly long period of time to bring about fundamental changes in the following areas.

1. We Must Make the Change from a Closed, Self-Sufficient Natural Economy to an Open Commodity Economy.

A survey of the world's agriculturally advanced nations reveals that their common point is the development of rural commodity production. For many years now a "self-sufficient" small-scale peasant economy has been practiced in the Chinese countryside, though for a long time it failed to be self-sufficient. It is only since 1983 that a surplus over low consumption levels has appeared in China's grain markets. The lack of development in the rural commodity economy has affected not only the level of peasant incomes and agricultural reproductive capacity, it has also directly affected the speed of industrial growth and the rise in nationwide consumption levels. The foundation and conditions already exist for development of the rural commodity economy in China's vast countryside. In order to develop the rural commodity economy in a planned fashion, the more developed regions of the two islet areas (the Chang Jiang delta and the Zhu Jiang delta) and the two islands (the Liaodong Peninsula and the Jiaodong Peninsula) along the southeastern coast and the Xiazhang Quan delta in southern Fujian should readjust their rural industrial composition according to the demands of "trade, industry and agriculture," and organize agricultural production and processing, as well as transportation and marketing. In particular, rural areas in regions where there is open foreign trade should develop advanced, outward-oriented agriculture. That is, it should be quite highly commercialized, specialized and modernized in order to become a "font" of agricultural modernization and rural economic commercialization for the nation as a whole, to play a role as a "window" and to become a region for demonstration and experimentation. As far as the nation as a whole is concerned, we should from now on seize this new turn of events

and, based on our domestic self-sufficiency and surplus in grain, expand cultivation of superior varieties of grain and improve grain quality. In addition, based on the demands of the international market, we should do some solid groundwork on farm produce, particularly in improving varieties, in preserving freshness during storage and in packaging and transporting fresh and live produce. We should make great efforts to develop famous products, special local products, new products, superior products and rare products, and change their colors, assortment and quality of workmanship in order to gradually gain a firm foothold and further expand our position in the international market.

2. We Must Change from "Small But Complete" Small-Scale Production to Specialized Production and Social Services.

Generally speaking, traditional agriculture is built upon "small but complete" small-scale production based upon "not seeking help with anything." Modern agriculture, on the other hand, is built upon socialized large-scale production based on specialized division of labor. The fundamental difference between large-scale and small-scale production lies not in the scale to which production is organized but in the degree of socialization. The higher the level of socialization, the more developed the forces of production. In certain agriculturally advanced nations there are many single-family household farms and ranches that have, through a variety of social service organizations such as "agricultural assistance" in Japan, various seed, agricultural chemical and fertilizer "companies" in the United States, "cooperatives" in the Federal Republic of Germany and so forth, organized the supply of pre-production, production and post-production materials and the marketing of farm and sideline products to form specialized, socialized large-scale production. The policy of "large and collective" that we pursued in the past was just closed production with the team as its foundation. The degree of specialization and socialization was very low, and though the scale of production operations seemed vast it never went beyond a kind of "large and complete" small-scale production. Since implementation of the contractual output responsibility system in the countryside, a pattern of household operation has gradually taken shape and all sorts of specialized and priority households have emerged. This is the embryo of development toward specialization in Chinese agricultural production. These specialized and priority households are just like a tiny workshop in the midst of large-scale industrialized production. They have been drawn tightly into the sphere of economic associations (neighborhood service centers; agricultural, industrial and commercial companies; and so forth), and, through this economic network of invisible socialized production, the production and marketing of thousands of households have been brought into the orbit of the state's planned commodity economy.

Specialization demands socialization of production services. If there is no series of socialized service organizations, specialized production and operation will be affected and their development cannot be guaranteed. Moreover, socialization may vastly accelerate the growth of specialized production.

3. We Must Change from Traditional Agriculture Based on a Narrow Economy to Modern Agriculture Based on Science and Technology.

China has abundant labor resources, but these can become a tremendous motive force for economic development only if they are integrated with corresponding capital and advanced technology and injected into production. At the present time, agriculture in developed nations has been gradually transformed from "natural-resource dependent" agriculture, which is tied to soil, atmospheric and other conditions, to "technology dependent" agriculture, which relies on breeding, cultivation techniques, crop rotation systems and mechanization. Developed nations already possess a set of well-perfected scientific and technical systems. Public recognition becomes clearer as time goes on that the essence of agricultural modernization lies in making agriculture scientific. Modern agriculture must rely on scientific and technological progress. The current problem is that we must achieve this reliance before we can promptly transform it into a socially productive force. First we must rely on improving the cultural and scientific level of the broad masses of peasants and depend on them in their vast numbers to consciously apply and popularize scientific research achievements and advanced technology in agriculture. Only then can these become a great motive force in agricultural development and promote basic growth away from traditional agriculture and toward modern agriculture. Alvin Toffler, the author of "The Third Wave," believes that if China's "ecosystematic cropping system," composed of integrated farming, forestry, animal husbandry and fishery, can form a body with solar energy, bio-gas, genetic engineering and computing mechanisms, it will be a major breakthrough and set an example for the world.

Now the countryside has taken on new life, studying and using science everywhere. We should strike while the iron is hot and enhance agricultural education and scientific and technological extension work. We should stick to a policy integrating education, scientific research and production and constantly improve the level of science and technology in the vast countryside.

4. We Must Change from a Uniform Agricultural Composition to a Multilevel Industrial Composition.

The mutual integration of agriculture, forestry, animal husbandry, sidelines and fishery, and the comprehensive development of agriculture, industry, commerce, transport and services is the fundamental path to bring about prosperity in China's rural economy. It reflects the objective requirements of internal relations and production development in the various rural industries. Rural specialized and priority households are now developing rapidly, and various forms of alliances are beginning to emerge. This is precisely the progress of agriculture toward the development of specialized, socialized commodity production, the momentum of which will bring about a transformation of traditional agricultural composition. We must adapt to new trends, make rational adjustments in the composition of agricultural production and rural industry, and bring about comprehensive growth in the countryside under new historical conditions.

First of all, cultivation must break away from the grain and cash-crop composition and develop toward a grain, fodder and cash-crop composition. Second, within the structure of agriculture, forestry, animal husbandry and fishery, we must do the following things: hasten the development of animal husbandry and improve its proportional position in agricultural production; give free play to diverse functions in forestry construction, and in particular stress ecological benefits; and make fish breeding the focal point of development in the aquatic products industry. Third, we must establish an industrial mix composed of agriculture, industry, commerce, transport and services. Without a doubt, small cities and towns are the base for comprehensive rural development, and rural and small town enterprises will become the major, mainstay industries of the rural economy.

Establishing a rational comprehensive industrial composition that conforms to local conditions requires a certain course, and several contradictions and limiting factors persist. Among these are two problems that absolutely cannot be ignored: The first is that readjustment of agricultural composition and peasant rehabilitation require a grain base, so there can be no relaxation of grain production. The second is that there must be an intense emphasis on rural communication and transportation problems. We must develop rural communication facilities as quickly as possible and open an outlet for transport and sales of farm and sideline products. Only then can we better readjust the rural industrial composition and promote comprehensive growth in the rural economy.

5. We Must Construct an Agriculture with Special Chinese Characteristics and Take the Path to Urban and Rural Integration and Joint Prosperity.

If we want to construct socialist agricultural modernization with Chinese characteristics, then taking the path to urban and rural cooperation, mutual advancement and joint development is indeed an extraordinarily important feature. A look at the many nations on earth that have developed commodity economies shows that their cities are more often than not overflowing with prosperity while their countrysides have long been destitute. This lopsided development even exists in some developing countries. Admittedly, disparities also exist now between urban and rural areas in China, and for many years rural growth has been rather slow. However, we have applied considerable attention to this problem, have adopted a series of policies and measures to implement reform and have made great efforts to build a new form of socialist urban and rural relationship.

12510

CSO: 4007/419

NATIONAL

FOREIGN TRADE IN FARM PRODUCE DISCUSSED

Beijing JINGJI RIBAO in Chinese 8 Aug 85 p 3

[Article by Gao Hongbin [7559 7703 6333], Chen Jian [7115 0256] and Liu Yun [character illegible] [0491 0336 ?]: "Take Advantage of Favorable Conditions To Move Agriculture in the Direction the Rest of the World Has Taken"]

[Text] In the course of developing foreign trade in Chinese farm produce there are several advantageous conditions of which full use should be made.

First, a great transformation has taken place in the pattern of world trade in farm produce. The number of farm-produce exporting countries has decreased while the number of importing countries has increased. In addition, world trade in farm produce has gradually formed two markets: the northern market, which is particular about varieties and quality, and the southern market, which stresses clothing the naked and feeding the hungry. In particular, a huge market exists in several developing countries where agricultural production has developed slowly and enormous pressure has been exerted by vigorously expanding populations.

Second, in the past few years the Chinese government's independent and self-initiated diplomatic strategy and flexible diplomatic tactics have produced an intense effect on the world. They have created an excellent international political environment for developing our foreign trade. In particular, our policy of opening up to the outside world has provided even more advantageous conditions for foreign trade.

Third, our domestic farm-produce supply capabilities have continued to improve and an industrial and agricultural trade system focused on the international market as its primary target has been gradually established in several regions. Several famous, high-quality products that formerly enjoyed a high reputation on the international market are now being restored and injected anew into that market.

Fourth, manpower exploitation has become a major trend in rural economic development. This will certainly accelerate the exploitation and utilization of natural and social resources and inject even more products into the international market.

Based on the above analysis, we should formulate the correct strategy and adopt the following effective measures:

1. We should make full use of China's traditional social emphasis on agriculture and her ample labor resources to actively implement a foreign trade strategy that links imports and exports. For one thing, in the near future we must make great efforts to develop labor-intensive, traditional products that have a regional national character, and we must work to expand exports and bring in more foreign exchange. In addition, we must make full use of foreign natural and social resources, develop imports in a timely fashion and actively introduce advanced agricultural science and technology.
2. At present China's outflow of exported farm produce is directed to a greater extent toward the southern market and to a lesser extent toward the northern market. With imports the opposite is true. Looking to the future, China must adapt itself to the features demanded of farm produce, such as diversity, high quality and so forth. We must improve varieties and raise quality to bring about a directed inversion of this long-standing flow of imported and exported goods.
3. We must vigorously develop farm produce processing and expand exports of finished products. In particular, the food processing industry must consistently emphasize the strategy of foreign trade development.
4. In order to prevent or weaken the impact that fluctuations in the world farm produce market might have on Chinese agricultural production, and also to encourage exports, it is essential that we establish a farm-produce export security fund and a farm-produce export development fund. In particular, considering that farm household operations have become the most basic operational level of the rural economy, it is of the utmost urgency that we supply effective monetary aid.
5. We must establish an overseas farm produce market monitoring system. This will react sensitively to the eternal fluctuations on the world farm produce market and improve our ability to meet any emergency.
6. We must establish an agricultural development research organization, which would conduct special research on relevant technological and economic policies concerning farm produce exportation, as well as on questions of law, farm technology improvements and trade industry and agriculture, and which would provide strategic decisions and plans.
7. In coastal regions we must establish a number of export product processing zones and demonstration zones for introducing technology from outside. In addition we must put into general practice a one-product-per-village campaign such as exists in Japan, put out hot-selling products and create high quality famous brands. The establishment of this kind of regionalization and specialization in the foreign trade base will contribute to the process of agricultural specialization, quickly improve labor productivity and enhance our competition capabilities.

NATIONAL

ISSUES IN FARM TECHNOLOGY TRANSFER DISCUSSED

Beijing JINGJI RIBAO in Chinese 8 Aug 85 p 3

[Article by Du Songnian [2629 2646 1628] and Liu Yuejin [0491 1471 6855]:
"Some Issues We Should Be Concerned About in Agricultural Technology Transfer"]

[Text] Farm technology transfer policies are powerful and far-reaching, so we must treat them conscientiously and with great care. We believe that the following issues must be resolved at the present time:

1. We must raise consciousness and enhance leadership in agricultural technology transfer. Agricultural introductions are of the utmost significance in accelerating technological reform, opening up natural agricultural resources, increasing farm yields and output values, and achieving agricultural modernization. However, due to the long time frame and slow results, farm technology transfer is now being neglected and energies are being directed toward industrial technology transfer. Consequently, we suggest that the leading sectors must assign special personnel to control agricultural introductions, research and formulate relevant policies, and provide counseling and information.
2. We must clarify the guiding ideology and formulate an overall program for technological transfer. The dimensions and effects of agricultural introductions are successful only to the extent that we can absorb and digest them. Therefore, we must make these introductions selectively, step by step, with a focus and a purpose in mind. We cannot rush headlong into action or abandon those actions with lack of forethought. A program for agricultural introductions is a component part of the overall agricultural development program and the social economic development program. If we deviate from this overall program and are out of line with plans, then we will certainly lapse into passive existence. A comprehensive program must encompass both long-term tentative plans and short-term projects, and it must integrate the two in an organic fashion.
3. We must bring the advantages of the numerous overseas Chinese into full play and adopt many levels and many paths to arrange for technology transfer. First, we must as quickly as possible implement house property policies for overseas Chinese. Second, we must resolve the problems handed down by history and thoroughly redress the grievances of those overseas Chinese, and their

families and dependents, that were persecuted in the past. Those who suffered economic losses should be appropriately reimbursed. Third, we must expand our relations with overseas Chinese abroad, both consolidating our relationships with old friends and clients and actively developing new friendships and clients. We can select families and dependents of overseas Chinese to work abroad, and we can invite the many overseas Chinese to return to their home villages to visit their relatives. At the same time, the state, the cooperatives and the individuals must work together to adopt many levels and many paths to arrange for technology transfer. At the present time we must particularly develop collective and individual initiative and encourage private individuals to arrange for technology transfer.

4. We must bring into full play the "window" roles of the special economic zones and strive to introduce foreign capital, fine varieties, advanced technology and administrative experience from abroad. Then we must popularize and transfer these to the countryside on the basis of what can be absorbed and digested. In addition, through various forms of economic coordination with the countryside, we must attract farm and sideline products into the special economic zones for processing and then export them at increased values. This will stimulate rural economic growth.

5. We must vigorously train capable personnel so that we can make introductions from outside and be able to utilize them. For agricultural technology transfer we need a contingent of capable personnel that have a good mentality, are dedicated, understand their work, understand administration and have a certain level of foreign language skill. This is especially true for scientific and administrative personnel. Only then can we achieve the ability to make introductions from outside and make use of them. But at the present there are extremely few such capable personnel, to the point that there is no way to digest and absorb certain projects. Consequently, the leading sectors at all levels must resolutely emphasize training. At the same time they must adopt methods of advertising for job applicants and assimilate talented people from society at large. They also might establish contact with universities and research units to resolve their personnel and technology problems.

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NATIONAL

CHINA'S 35-YEAR ACHIEVEMENTS IN WATER CONSERVANCY

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[Text] I. Current Water Conservancy Projects

Since the founding of the People's Republic and under the guidance of the CPC, the Chinese people have assumed the attitude of masters of nature in the eastern part of the world and carried out a large-scale struggle to control water. The "Resolution of the CPC Central Committee Concerning Certain Problems of the Party Since the Founding of the People's Republic," which was passed at the 6th Plenum of the 11th CPC Central Committee, pointed out: "For the most part, flood disasters on major rivers such as the Chang Jiang, Huang He, Huai He, Hai He, Zhu Jiang, Liao He and Songhua Jiang, have been brought under preliminary control." This is a great victory achieved by the people under the socialist system in controlling water. When examined from the perspective of several thousand years of ancient history and of over 100 years of modern history, China's present-day water conservancy undertakings have truly achieved epoch-making accomplishments.

Led by the spirit of the 3d Plenum of the 11th Central Committee and on the foundation of the summation of over 30 years of experience and lessons, the entire nation's water conservancy front line has already entered a new stage of development.

A. China's Water Resources

The production and daily life of people are inseparable from water, which is a basic prerequisite for human existence and social development. With the development of China's national economy, various aspects of industrial and agricultural production, urban and rural construction and people's lives have made constantly increasing demands on water resources, but useable water resources are by no means inexhaustible. Consequently, with each day the development, use and production of water resources and the prevention of flood and drought become ever more important tasks.

China has a vast territory and many rivers. There are about 420,000 kilometers of rivers and streams, large and small. Of them, there are over 5,800 large- and middle-sized rivers with river basin areas larger than 1,000 square kilometers. There are over 2,000 lakes, large and small, and of these, 130 have areas larger than 100 square kilometers.

Due to geographical conditions, particularly the effect of the monsoon climate, China's water resources have the following characteristics:

1. The total amount of water resources is not small, but the per capita amount is very low.

In most years, China's average annual rainfall is about 6 trillion cubic meters, which converts to 630 millimeters--about 5 percent--of the earth's total rainfall. The average annual run-off for China's rivers and streams totals 2.6 trillion cubic meters, which is 6th in the world, after only Brazil, the Soviet Union, Canada, the United States, and Indonesia. But calculated by the average per-capita amount, the world per-capita average is 10,930 cubic meters and China's is only 2,700 cubic meters, equal to only one-fourth of the world per-capita average, and roughly equal to the amount of water actually used per capita in the United States in 1975 (2,528 cubic meters).

2. The basic imbalance in the local distribution of water resources is defined by a lot of water in the south and little in the north.

The normal annual rainfall on China's southeast coast is greater than 1.6 meters; south of the Huai He and Qinling, it is greater than 0.8 meters; in North China and in the Northeast it is between 0.4 and 0.8 meters; and in the vast reaches of the Northwest it is less than 0.25 meters. The annual run-off of the Chang Jiang, Zhu Jiang, rivers of the southeast coast and of the Southwest is 80 percent of the nation's total, and the cultivated area of their river basins is 38 percent of the nation's total; but the annual run-off of the Huai He, Huang He, Hai He and the rivers of the Northeast and Northwest regions which are located in arid and semi-arid zones is only 18 percent of the nation's total, and yet the cultivated land of their river basins is 62 percent of the nation's total. Calculating surface water resources per mu of cultivated land, the Zhu Jiang basin has 3,932 cubic meters, the Chang Jiang basin 2,643 cubic meters, the Songhua Jiang basin 432 cubic meters, the Huang He basin 286 cubic meters, the Huai He basin 281 cubic meters, the Liao He basin 214 cubic meters and the Hai He basin 188 cubic meters. The composition of water and land resources is extremely unbalanced.

3. There is time imbalance in the distribution of rainfall, that is distribution between years and between seasons, with very great differences.

Most areas in the country have little rain in the winter and spring and a lot of rain in the summer and autumn, and in the flood season, the amount of rain is too concentrated and often results in flooding and waterlogging. In the north, the amount of rain in the flood season is between 70-80 percent of the annual rainfall. For example, the rainfall in Beijing between June and September is 85 percent of the annual rainfall. There are considerable

changes between years in rainfall. For example, the rainfall in Beijing in 1959 was 1.405 meters, and yet in 1921 it was only 0.256 meters, nearly a 5-fold difference.

The above features determine the particular importance, difficulty, duration, and complexity of water conservancy in China. This is what makes China different from many countries of Western Europe and the Americas.

B. The Long History of Water Control

China is a country with frequent flood and drought disasters, and according to incomplete statistics, in the 2,155 years between 206 B.C. and 1949, 1,092 great floods occurred in China and 1,056 droughts, with a flood or drought nearly every year. In the 20 years prior to liberation, the major drought of 1928 spread throughout the country, with bare soil for thousands of miles and starved corpses filling the roads; and victims of the disaster reached 120 million. Between 1931-1939, major floods occurred in the Chang Jiang, Han Shui, Huai He, Huang He and Hai He basins, rivers overflowed and inundated many villages and towns, and tens of thousands of people became homeless and destitute, shocking the world.

Historically, frequent floods and droughts have been a severe menace to the existence and development of the Chinese people. Consequently, water conservancy became an important task of past dynasties in pacifying the country and managing state affairs. The legend of how the Great Yu prevented floods by water control reflects the very long history of water control in China. Inferring from documentary records and legends, around the 21st century B.C., the Huang He basin probably had some primitive water control projects. China's ancient people constructed many great projects that were worthy of pride. Sichuan's Du Jiang Yan created the famous land of Tianfu; the irrigated areas at the bend of the Huang He worked wonders with lush southern-type fields north of the Great Wall. The Grand Canal between Hangzhou and Beijing, which was begun in the Spring and Autumn Period and was continued during the Sui and Tang and down to the Yuan, Ming and Qing; the big dikes of the Huang He whose origins were in the Spring and Autumn and Warring States periods; the Chang Jiang seawalls that were begun in the Eastern Han period; and the irrigation system of wells connected by underground channels and built by various minority peoples in Xinjiang over the centuries, have been praised as four great ancient water conservancy projects that rival the Great Wall. In addition, the present Anhui Shaopi (that is, the Anfeng Tang reservoir and irrigation project), Hebei's 12 canals for diverting the Zhang which were built during the Spring and Autumn and Warring States periods, Shaanxi's Dengguo Canal, Guangxi's Ling Canal, Zhejiang's Jian Hu of the Eastern Han, Beijing's Li ling Yan-Chexiang Canal of the Cao Wei, Zhejiang's Tayou Yan of the Tang Dynasty, the Lai Canal of the Ningxia Tang, Tai Hu's low lying fields surrounded by dikes, Fujian's Mulan Pi of the Song Dynasty, and Yunnan's Dianchi water conservation project of the Yuan and Ming, etc.--all amply reflect the intelligence of laboring people in ancient times and their outstanding accomplishments in water control.

C. Great Construction Accomplishments

Since the founding of the People's Republic, under Central Committee leadership, the entire party has given full attention to water conservancy, and Comrades Mao Zedong and Zhou Enlai personally guided water control construction for large rivers and streams.

Not long after the birth of New China, the national economy was just recovering and the War to Resist America and Aid Korea was in progress. Just at that time, in order to totally eliminate flood and drought disasters in the Huai He basin, Comrade Mao Zedong proclaimed the strategic policy of "bringing the Huai He under permanent control" and issued an appeal to "definitely settle the matter of the Huang He." The Second Plenum of the First National People's Congress, which convened in 1955, passed Vice Premier Deng Zihui's "Report on the Overall Plan for Permanently Harnessing Huang He Flood Disasters and Developing Huang He Water Conservancy," prepared by the State Council. In 1963, after a flood of rare magnitude occurred in the Hai He basin, Comrade Mao Zedong proposed that "we definitely must bring the Hai He under permanent control." He also made many decisions concerning construction on the long Chang Jiang, and personally approved the construction of the first dam--the Gezhou Dam Water Conservation Link. In line with the strategic decisions of the Central Committee and Comrade Mao's objectives, Comrade Zhou Enlai personally directed, examined and approved the guiding principles and tasks of every stage of water conservation work, the harnessing of every river and stream and the construction of many major engineering projects. To solve the many major problems in water control, Comrade Zhou Enlai personally went to the sites to understand the situation, immersing himself in the masses to investigate and study, and listened to the opinions of many specialists and engineers, and only after repeated study did he make decisions.

For 35 years, through the common effort of party committees at various levels, the government and the people of various nationalities throughout the country, China's water conservancy construction has attained great achievements. The nation has created a contingent of one million water conservancy workers and staff, including specialists in the fields of hydrology, survey, design, construction, management, science and technology, and education, and together with 100 million peasants, they have struggled bitterly, overcome difficulties and created water conservancy facilities for the New China and, moreover, have laid the foundation for continued future development.

1. They have dredged rivers and lakes, rebuilt and constructed 170,000 kilometers of dikes and protective embankments in lakeside areas, and opened up floodwater drainage outlets for the Huai He and Hai He.

2. Right after liberation, there were only a few dikes and small reservoirs, and only 20 large- and medium-sized reservoirs. Now, they have constructed 86,000 reservoirs and 6.19 million dikes. The total amount of water stored in the reservoirs is 420.8 billion cubic meters. There are 2,702 large- and medium-sized reservoirs with a total capacity of 364.6 billion cubic meters.

3. The power for electrically pumped irrigation and drainage has gone from 96,000 horsepower to 78.76 million horsepower. In the north, motor-pumped

wells have started from nothing, and there are now 2.41 million. In addition, there are now 43,500 wells with water turbines in 28,200 places.

4. There are 5,288 places where large- and middle-sized irrigated areas have been set up with an irrigated area of 312 million mu. Of them, there are 143 places with large-scale irrigated areas larger than 300,000 mu, with a total irrigated area of 115 million mu. The proportion of irrigated areas in the various basins is presented in Table 1.

Table 1. Percentage of Irrigated Areas in Various Basins

Basin	Cultivated area (10,000 mu)	Irrigated area (10,000 mu)	Percentage of irrigated area
Chang Jiang	37,000	22,700	61
Huan He	19,600	6,400	33
Huai He	18,800	11,000	58
Hailuan He	17,000	9,600	56
Zhu Jiang	7,800	4,000	50
Songhua Jiang	17,500	2,000	11
Liao He	6,900	1,880	27

5. They have developed 241.6 kilowatt of hydroelectricity, of which the combined installed generator capacity for water conservancy projects is 10 million kilowatts. In addition, the nation has built 76,000 small hydroelectric facilities, with an installed capacity of 8.5 million kilowatts, and in 1983, the amount of electricity that they produced reached 200 million kilowatt hours. The proportion of water power resources developed on various rivers is shown in Table 2.

Table 2. Percentage of Developed Water Power Resources for Various Rivers

Basin	Water power resources that can be developed (10,000 kw)	Water power resources that have been developed (10,000 kw)	Percentage of what can be developed
Chang Jiang	19,724	684	3.4
Huang He	2,800	250	9.0
Huan He	66	28	42.0
Hai Luanhe	213	40	19.0
Zhu Jiang	2,485	201	7.4
Songhua Jiang	600	75	12.5
Liao He	35	9.5	27.0

6. Reservoir water surfaces provide 30 million mu of new water area for fish cultivation. The managing units of water conservancy projects use the water

and soil resources and facilities in the spheres that they manage and protect to develop a diverse economy, and their total income (including water and electricity fees) increased from 300 million yuan in 1978 to 930 million yuan in 1983. The 21 provinces, municipalities and autonomous regions of Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, Beijing, Shanghai, Jilin, Jiangsu, Zhejiang, Fujian, Shaanxi, Gansu, Xinjiang, Yunnan, Qinghai, Shanxi, Hebei and Shandong have reached a point where they are self-sufficient in administrative expenditures.

7. They have constructed a large number of field projects such as ditches, canals, culverts, sluice gates, bridges and stations, and there are 25,000 water sluices alone.

8. They have basically completed a national network of hydrologic stations. The national network of hydrologic stations has grown from just over 300 after liberation to over 3,400 currently, with over 20,000 rain measurement stations, and over 10,000 groundwater observation stations. Of these, there are over 8,700 places with stations that assume regimen tasks, and have accumulated a large quantity of basic hydrologic data, basically satisfying the needs of water resource development construction and meeting the needs of flood prevention and control.

D. Outstanding Project Results

Since the establishment of the People's Republic, the results of water conservancy projects have been very obvious:

1. They have raised the flood prevention capacity of rivers, and brought frequent flood and drought disasters under preliminary control and basically guaranteed the development of industrial and agricultural production and of urban and rural safety.

The Huang He is the cradle of the Chinese people and is also "China's Sorrow." Because it has the highest amount of silt in the world, the river bed in its lower reaches is constantly rising, becoming the famous "suspended river" historically, breaching its banks cyclically and changing its path. Starting at Mang Shan in Zhenzhou, north to Tianjin and south to Huaiyin, all are within the scope of its overflow. But because the Sanmen Gorge reservoir, the Luhun reservoir, and the reservoirs and dikes of main and branch streams, water detention basins, river channel dredging and other components of the flood prevention system have already assumed preliminary scale, flood prevention capacity has greatly increased. Moreover, it has been tested by the great floods of 1958 and 1982, and the Huang He, which formerly was "breached twice in 3 years," has now attained a state of more than 30 successive years of peaceful billows.

In the Huan He basin, which formerly had "a great flood with a big rain, a little flood with a little rain, and a drought with no rain," they have now repaired and built over 20,000 kilometers of dikes, constructed many reservoirs and over 10 flood storage and flood detention areas, and the amount of discharge entering the river and sea went from 8,000 cubic meters per second to 25,000 cubic meters per second. They constructed many large-scale

irrigated areas such as Pishihang, Nanwan and Hongze Hu, constructed the Jiangdu electric power, irrigation and drainage station with a planned discharge capacity of 400 cubic meters per second, and now has a quite complete system of flood prevention, drainage and irrigation projects. Through effort, the main streams of the middle and lower reaches of the Huai He can now guard against a flood of the scale of the 1954 flood. In 1968, large floods occurred in the upper reaches of the Huai He of a scale rarely seen in history, but because the reservoirs retained water, river channels carried the floodwaters and flood retention areas played their role, the Huaibei Great Diike safely weathered the flood. In 1978, the most severe drought in 100 years occurred in the Huai He basin; 880 million mu of fields were irrigated, and the year of the great drought brought a bumper crop. There has been a significant change in the appearance of well-known poor districts of the past such as Luxinan, Yudong, Subei and Huaibei.

The Chang Jiang is China's longest river, and its middle and lower reaches are one of the quintessential areas of economic development. To combat and defend against floods, we built the Dujiatai and Jing Jiang flood diversion projects, strengthened the dikes, and completely dredged the main branches of the Han Jiang. Hubei, which is usually called the "land of 10,000 lakes," in the past had "2 droughts in 3 years and 9 floods in 10 years." In 1931, when the Chang Jiang broke its banks, it flooded 52 counties, and when the water level at Hankou station reached 26.79 meters, it burst through the dikes and the area was soaked in water for more than 100 days; and yet at the time of the particularly great flood of 1954, when the water level at Hankou station reached 29.73 meters, the city of Wuhan was still safe without incident. The great Chang Jiang flood of 1983 holds the third place record for high water level at Hankou station, following 1954 and 1931, since they began to keep records in 1965. Yet because of the part played by water conservancy projects, in addition to the large army of people who spared no effort to defend the area, the 3,500-kilometer-long dike was not breached, and the 152 million mu of farmland that flooded were drained of 20.5 billion cubic meters water using pumps totalling over 500 kilowatts of power, and the daily flow reached a peak of 3,500 cubic meters per second, allowing the calamity for 14 million mu of soaked fields to be very greatly reduced or completely prevented.

Since construction of the key Danjiangkou water control project, the overall benefits of flood prevention, power generation, irrigation, navigation and fish cultivation have been obvious. Between 1967, when they let the stored water through the sluice, and 1983, there were 45 occasions when flood water on the upper reaches of the Han Jiang was over 10,000 cubic meters per second, and of these, there were 11 times when the Danjiangkou completely retained it, 24 times when it reduced the flood peak by over 50 percent, thereby greatly reducing the flood damage on the middle and lower reaches of the Han Jiang; there were 12 times when it averted Minyuan flood diversion and 19 times when it averted using the Dujiatai flood diversion area, in total reducing the flooding and loss of 10.37 million mu of land and reducing economic losses by 3.6 billion yuan. Since going on line in October 1968, down to the end of 1983, the Danjiangkou hydroelectric power station, with a total installed capacity of 900,000 kilowatts, generated 52.4 billion kilowatt hours of electricity and earned 3.4 billion yuan in economic benefits, which is equal to four times the total cost of building the whole project (820 million yuan).

The flood prevention capacity of the Hai He basin is also very evident. They have built and expanded a number of reservoirs on the upper reaches of the river, raising the capacity of the mountain areas for retaining flood water. On the lower reaches, they have opened up and dredged over 30 key river channels, and the capacity for draining floodwaters into the sea has increased from 4,000 cubic meters per second to over 20,000 cubic meters per second.

The flood prevention capacity the Zhu Jiang, Liao He, Songhua Jiang and other rivers has also markedly increased.

Following are the dredging situation and flood prevention standards for seven major rivers (Table 3 and Table 4).

Table 3. Dredging in Seven of China's Major River Systems

River System	Songhua Jiang	Liao Jiang	Hai Luan He	Huang He	Huai He	Chang Jiang	Zhu Jiang
Basin area (10,000 sq. km.)	55	23	32	75	27	180	45
Typical avg. annual discharge	760	157	292	560	500	9,790	3,410
Population (100 million)	0.47	0.29	0.98	0.82	1.25	3.45	0.76
Cultivated land (100 million mu)	1.75	0.69	1.70	1.96	1.88	3.70	0.78
In-place large & middle-size reservoirs	114	83	123	155	185	965	362
Total reservoir capacity (100 million cubic meters)	185	129	247	536	358	920	388
Reservoir capacity as % of discharge	24	82	73	84	72	9.1	11

Table 4. Flood Prevention Standards Reached by Seven Major Rivers

Songhua Jiang: Farmland flood prevention standards are for a once-in-10-20-years flood, and for Harbin, Qiqihar and Jiamusi, a once-in-40-years flood.

Liao He: Embankments on mainstreams can withstand a once-in-10-20-years flood, Shenyang, Fuxun and Liaoyang, a flood of once in more than 100 years, and for Benxi, for a once-in-less-than-20-years flood.

Hailuan He: The northern system can withstand a flood the size of the 1939 flood, the southern system can withstand a flood the size of the 1963 flood, and equal to a standard of a once-in-50-years flood.

Huang He: It can withstand a flood the size of the 1958 flood (the flood peak discharge at Huayuankou is 22,000 cubic meters per second). Because the river bed is constantly silting up, the embankment must continually be raised.

Huai He: The middle reaches of main stream can withstand a flood the size of the 1954 flood, equal to a once-in-40-years flood, the lower reaches can withstand a once-in-more-than-50-years flood, and the main branch streams, a once-in-10-20-years flood.

Chang Jiang: The mainstreams on the middle and lower reaches and lake area dikes can withstand a once-in-10-20-years flood, but for a flood the size of the 1954 flood (a once-in-40-years flood), it can only protect the safety of the Jing Jiang embankments and Wuhan municipality.

Zhu Jiang: The dikes of the mainstreams and the delta area can withstand a once-in-10-20-years flood.

2. We have developed irrigation, creating conditions for increased agricultural production. The total irrigated area has grown from the very low standard of 210 million mu right after Liberation to 700 million mu. The irrigated area which is not even half of China's total farmland has two-thirds of the total grain yield. The development of water conservancy has promoted the organizational reform of agriculture, and the area sown to paddy rice has increased from 340 million mu to 500 million mu. The irrigated land for dry crops increased from 48 million mu to over 340 million mu. The state stressed construction of water conservancy projects in commodity grain bases such as Taihu, Poyan Hu, Dongting Hu, Lixia He, the Jiangnan Plain, the Chuanxi Plain, the San Jiang Plain, Pishihang, the Guanzhong Plain, the Zhu Jiang Delta and the central part of Jilin. Both the grain yields and the cash crop yields of these areas are much greater than the average yield of the province, municipality or autonomous region where they are located (see Table 5).

Table 5. Comparison of Per-Unit Grain Yield in Irrigate Areas with the Average Per-Unit Yield in That Province, Municipality or Autonomous Region

Name of Irrigated area	Irrigated area (10,000 mu)	Per-unit yield (jin/mu)	Avg. per- unit yield for Province, Municipalities and Autonomous Regions (jin/mu)	Difference (jin/mu)
Ningxia's Weining	67	765	236	529
Gansu's Jinghui Dianguan	12.56	688	203	485
Shaanxi's Jinghui	135.5	480	245	235
Liaoning's Hunsha	40	850-1030	493	357-537
Beijing's Chao He	36.1	963.6	455	508.6
Hebei's Luan He, lower reaches	74.21	823	287	536
Zhejiang's Wenhuang Plain	104	1600	561	1039
Jiangxi's Ganfu Plain	78.65	1000	450	550
Shandong's Chanzhi	30.6	630	378	252
Henan's Renmin Shengli Canal	54.96	1060	342	718
Hunan's Ouyang Hai	73	1120	534	586
Sichuan's Du Jiang Yan	890.7	615	448	167

3. They have brought waterlogged and saline-alkali soil under control. The nation has 360 million mu that are easily waterlogged and we have brought 270 million mu of this, or 75 percent, under preliminary control. In the north, 108 million mu is saline-alkali soil and we have already brought 65.87 million mu, or 60 percent, under control. In the south, through cooperation with agricultural departments, 110 million mu of low-yield land, such as cold soaks, mud, and rusty water have already been transformed into 50 million mu of land through measures such as opening up ditches, drainage and rational irrigation.

Before liberation, the Huaibei area of Jiangsu was an area famous for severe disasters, with frequent natural calamities such as flooding, waterlogging, drought and alkalization. Since the founding of the People's Republic, we have persevered unflinchingly in implementing farmland water conservancy construction, and at present, have preliminarily created five project systems for flood control, draining waterlogging, drought prevention, tide blocking, reducing soaking and also implemented cross-basin management. In July 1983, the Huaibei area was assaulted by a particularly heavy soaking rain, and over 11 million mu of farmland became waterlogged and 6 million mu were one vast sea, with the water more than a meter deep. We adopted comprehensive management involving water storage, shifting, pumping and draining, and 3 to 4 days after the rain, a large area of waterlogged land was basically pumped out. For the broad countryside, there are no disasters in big disaster years, lush forests and abundant grain is everywhere, the five occupations are prospering, all of which presents a flourishing scene.

In the past few years, the diversion of the lower reaches of the Huang He for irrigation in Shandong and Henan has developed very rapidly, and in 1983, the irrigated area reached 21.59 million mu. Since 1972, a total of 10.2 billion cubic meters of Huang He water has been diverted. At the same time, the saline-alkali soil on both banks has been improved, greatly promoting agricultural development in this area.

4. Every year, 57 billion cubic meters of water is provided to industry and cities, and within this, water used in industry increased 11-fold, and the water used in urban daily life has increased 7-fold (see Table 6).

Table 6. The Increased Use of Water by Industry and Agriculture

(Unit: 100 million cubic meters)

	<u>1949</u>	<u>1957</u>	<u>1965</u>	<u>1979</u>
Agriculture	1001	1938	2545	4195
Industry	20	79	119	263
Heat and electricity	4	17	62	260
Urban residential use	6	14	18	49
Total	1031	2048	2744	4767

According to statistics on 14 large-scale reservoirs at mountain passes along the Hai He, in the 18 years since 1962, 100 billion cubic meters of flood water have been regulated, and of this, the two reservoirs of Miyun and Guanting alone have supplied 26 billion cubic meters of water to Beijing and 13.7 billion cubic meters to Tianjin and Hebei since their construction in 1979.

With the overall development of the national economy, the contradiction between supply and demand for urban water use has become more acute; throughout the country there are over 150 cities with water shortages. To solve the water problem for Tianjin, since 1972 the state has diverted water from the Huang He to Tianjin on five occasions. In September 1983, the conveyance project diverting water from the Luan into Tianjin was triumphantly opened up. At present, this is the largest urban water supply project in China that crosses basins. The surging water of the Luan He passes through Panjiakou, Daheiting reservoir, and a 234-kilometer-long canal and then enters Tianjin. It guarantees a supply of water for Tianjin's industry, agriculture and the daily lives of its people.

To solve the more than an a half-century long water shortage in Dalian, the Billu He reservoir was constructed, and the conveyance project for diverting the Billu He into Dalian were completed at the end of 1983. In addition, the nation also supplied water to Shenyang, Shunfu, Changchun and other cities.

5. We have developed hydroelectric power and carried out multi-objective development. According to survey statistics for water energy resources, there are 3,019 rivers with water energy reserves of 10,000 kilowatts or more; the national theoretical reserves are 680 million kilowatts, with 380 million kilowatts that can be developed and used.

Since the establishment of the People's Republic, there has been considerable hydroelectricity development; 96 large and medium-sized hydroelectric stations have been constructed, of which 17 have an installed capacity of 250,000 kilowatts or more.

With the development of science and technology in the fields of water conservancy and hydroelectric power, the construction level has continually risen. In the 1950s, relying on our own strength, we built the Xinan Jiang hydroelectric station, which was 105 meters high, with a total reservoir capacity of 22 billion cubic meters and an installed capacity of 662,500 kilowatts, and for the first time adopted the key arrangement form of a spillway dam over the roof of plant, and also built a new road in order to construct the dam. In the 1960s, again, we built the Liujia Gorge hydroelectric station at fairly rapid speed and of high quality with a total installed capacity of 1.16 million kilowatts, and the Danjiaangkou hydroelectric station with an installed capacity of 900,000 kilowatts. In the 1970s, there was even greater development in water conservancy and hydroelectric power construction, and at the same time, work was begun on more than 10 large-scale hydroelectric stations; we also carried out reconstruction of the key Sanmen Gorge water conservancy project, and both the scientific and technological level and the mechanized construction level for water conservancy hydroelectric station construction have risen. Entering the 1980s, we built what is presently China's largest key water conservancy project, the

Gezhou Dam. The total installed capacity of this project is 2.715 million kilowatts, and it solves a whole series of complex technical problems, including such energy-saving features as cut-off for a large river, prevention of rushing with a single, large, broad-flow sluice gate, and large locks. This symbolizes that China's water conservancy and hydroelectric plant construction have entered a brand new stage.

Simultaneously, small-scale, rural hydroelectric station construction attained vigorous development. According to survey statistics, the nation has 70 million kilometers of small-scale hydroelectric resources that can be developed, and moreover, they are broadly distributed; over half of China's counties can develop 10,000-kilowatt-plus small-scale hydroelectric stations. There are now 1,550 counties that run small-scale hydroelectric stations, 770 of which rely primarily on them for their power supply; 270 counties operate 10,000-kilowatt-plus stations, and 51 counties have 20,000-kilowatt-plus stations. Throughout the nation, 520,000 kilometers of 6-35 kilovolt high-tension lines have been erected. The development of small-scale hydroelectric power has energetically promoted the development of local industry and rural and small town enterprise, raised the ability of farmland to resist drought and drain waterlogging, promoted increased agricultural yields, brought about the mechanization of agricultural and sideline product processing, reduced the heavy labor of peasants and conserved manpower, accumulated funds for collectives, enlivened rural cultural activities and promoted the construction of the two civilizations. In the past few years, some areas have used their excess power in the rainy season to carry out experiments in "substituting firewood with electricity, and substituting coal with electricity," and also played a large role in protecting the mountain forests, in the greenification of the motherland, and in maintaining the ecological balance. In 1983, with the approval of the State Council, the nation selected 100 counties as trial sites for carrying out Chinese-style rural electrification. The extensive development of small-scale hydroelectric stations presents broad prospects for the realization of rural electrification.

6. Soil erosion has been brought under control. According to statistics, there were 1.5 million mu of eroded soil immediately after liberation, but through the joint efforts of farming, forestry, animal husbandry, aquatic and other sectors, we have now already brought 420,000 mu under preliminary control, or 26 percent of the eroded area. In 1982, the State Council promulgated "Work Regulations for Soil Protection," further promoting soil protection work and accelerating bringing it under control. The experience of households contracting out to bring small river basins under control has already been widely implemented in Qinghai, Ningxia, Gansu, Nei Monggol, Shaanxi, Shanxi and Henan, and the area where soil erosion has been brought under control through contract constitutes 52 percent of the entire area where various measures were used during this same period. This responsibility system that combines responsibility, rights and benefits and united control, management and utilization has tremendous vitality.

E. Creating a New Situation in Water Conservancy Work

Since the 3rd Plenum of the 11th CPC Central Committee, our water conservancy front line has implemented the spirit of this plenum and of the 12th CPC

Congress, conscientiously summed up the experience and lessons of water conservancy work since the establishment of the People's Republic, and continually weeded out the "left" mistakes in water conservancy work, implemented the guiding principles of readjustment, restructuring, consolidation and improvement, and shifted the focus of water conservancy work to raising economic results, thus creating a new situation in water conservancy work.

Since the founding of the People's Republic, China's water conservancy construction has generally passed through two stages: the first stage was before 1957, when under the leadership of the Party's correct line, work developed smoothly; the second stage was from 1958 to 1976, when there was great development in water conservancy construction and it attained very great accomplishments, but because of "leftist" mistakes, we also paid huge costs and the projects have left many problems behind. One concentrated expression of "leftist" influence in water conservancy work was not paying attention to economic results. Because of undue haste to get results and doing projects on too large a scale, plus poor management, many projects that are already built have not fully shown their benefits; this is a tremendous potential that can be tapped.

In March 1983, when Premier Zhao Ziyang carried out an investigation and study of Shaanxi Province, he thoroughly analyzed the role of water conservancy and its existing problems, and pointed out: From now on water conservancy construction must implement the guiding principle of "strengthening management and administration and stressing economic results," and in this guiding principle lies the key to beginning a new phase in water conservancy in order to shift the focus of water conservancy work in a clearer direction.

To implement this guiding principle we must resolutely shift water conservancy work onto a track that makes raising economic results the main thing, conscientiously examine and correct wasteful tendencies of the past, and earnestly change work methods that pursue only the project and are not concerned with input or output or about cost accounting. China has severe flood and drought disasters and the people's demands on water conservancy are very high, but the nation's funds are limited, and so this requires that we use systems engineering methods, overall planning, comprehensive demonstrations and do everything possible to gain the greatest output from the least social input, and also that we strengthen management and administration and strive to create a benign cycle in the application of water conservancy funds.

Consistent with China's natural conditions and the existing water conservancy structure, from here on out the development of water conservancy must adopt the interior as the main thing. Our focus is still to raise the economic results of the projects we already have, and through the consolidation, complementing and transformation of projects we now have and through the management and administration of the entire water conservancy undertaking, raise the overall economic results of water conservancy for the entire society. We must proceed from the overall interests of the national economy, and do well with the management, protection, planning and overall utilization of water resources.

The prime task of water conservancy work is still to guarantee the flood control safety of major rivers. To this end, we not only must gradually strengthen flood control engineering facilities, but must also adopt non-engineering measures (that is, communication management, flood diversion and flood storage, flood control insurance, etc.), and strive to reduce losses when a particularly large flood occurs.

We must strive to reduce input and increase output for irrigation and drainage projects and put our efforts in the areas of saving water and energy, increasing output and overall management. In farmland water conservancy and in water and soil protection, we must meet the new situation in rural development and strengthen policy study and scientific guidance. We must initiate the coordination of water supply, water transport, aquatic product and hydroelectric enterprises for the ever-growing urban industries and actively serve them. And we must further relax policies for rural electrification, go the new road of an electrified countryside and serve the development of a new rural situation.

On a foundation of consolidating and transforming our present engineering facilities and of actively developing small-scale water conservancy, we must carry out key construction based on selection of the best by national financial resources and stress the overall situation in planning strategic measures that will affect the major rivers and streams and the supply of water to industry and agriculture.

On the middle reaches of the Huang He, we must stress developing water and soil protection, and on the lower reaches, carry out reinforcement repairs for the fourth dike, construct small sub-breaker projects and jointly apply these to the Sanmen Gorge Reservoir and the reservoirs of the Huang He's branches in order to greatly raise the flood control standards of the Huang He's lower reaches. In this way, we can both alleviate flood control tension and danger and guard the safety of the great plain of the Huang He, Huai He and Hai He, and can also bring multiple benefits into play such as supplying water, generating electricity, irrigation and drainage, etc. We must get a good handle on studying the Daliaoshu plan or the Heishan Gorge, Wanjiashai and Longmen plans, select the best and make construction arrangements.

At the same that we consolidate and heighten the embankments and dredge the river course of the Chang Jiang, we should implement the flood control and tide control projects for the Shanghai municipal area and the dredging of the mouth of Tai Hu and the Chang Jiang, integrate energy resource construction, actively prepare to build the key Sanxia water conservancy project, energetically striving to begin work on them during the Seventh 5-Year Plan, and gradually bringing them into play during the 1990s.

The key renovations for the Huang He are for the river course and embankments for the mainstream of the middle reaches safety measures for flood flow and flood storage areas and opening up a waterway from the lower reaches of the river into the sea. We will continue to build the project "moving south and shifting east" for the lower reaches of the Yishu.

We must recover and consolidate the flood control capacity of the Hai and Luan He basins' water courses, renovate and reinforce the Guanting and Yuecheng reservoirs, and also build needed reservoirs. We must stress the control of the Yongding He and ensure the flood control safety of Beijing and Tianjin. The key to controlling the Zhu Jiang is the Bei Jiang, building the key Feilai Gorge water conservancy project and developing the water energy resources of the Hongshui He.

To solve the water shortage in the north, we must built the necessary cross-basin water shifting projects. In the near future, we must strive to complete the first phase of the project to shift water from the south to the north as quickly as possible, and finish preparations for the second phase of the project.

We must speed up the water conservancy construction and the soil and water protection work of the "three xi's" (Gansu's Dingxi and Hexi and Ningxia's Xihaigu), and carry out the construction of key water conservancy projects in Xinjiang and in the Hainan Dao region.

Water conservancy is a great undertaking to transform nature and build the motherland. Right after the founding of the People's Republic, our beloved Comrade Zhou Enlai encouraged the water conservancy workers of the whole nation in the water control spirit of the Great Yu. Today, to initiate a new phase in water conservancy work, we must be courageous in probing and in blazing new trails, make raising economic results the prime thing, do well in all areas of work, and provide flood control safety and water supply guarantees in order to realize the overall goal of quadrupling the total industrial and agricultural output value of the nation by the end of the century and in order to make a new contribution to the four modernizations of the motherland.

II. A Model for Key National Construction--The Project To Divert the Luan He into Tianjin

Running through the Jidong [eastern Hebei] region, by the foot of Yan Shan and the Great Wall, a clean, crystal-clear silvery waterway 100-li in length threads through the mountains and passes over ranges, meandering and twisting, intimately linking the two sister rivers, the Hai He and Luan He, which had not had contact since antiquity. This 100-li waterway is the project to divert the Luan into Tianjin--a large-scale facility to supply urban water that the brave people of Tianjin and the officers and men of the People's Liberation Army built in only 1 year and 4 months, which traverses province and municipal boundaries and crosses basins, and which provides a complete system for diverting, transporting, storing, purifying and distributing water.

A. Water Shortage--Tianjin City Asks for Emergency Help!

Tianjin Municipality, located in the eastern part of the North China Plain at the tail of the Hai He basin, is the third largest city in China and is also a land and water communications hub, commercial center and comprehensive industrial base for north China. In 1980, the total industrial and agricultural output of the city reached 20.898 billion yuan. Concerned departments envision that by the end of the century, the total industrial and agricultural output of the city will reach 100 billion yuan, more than quadrupling that of 1980. The development of Tianjin's economy holds a decisive position for China.

"For the city to exist, for industry to develop and for output to quadruple, water is the number one factor." The people of Tianjin have long recognized this principle in their economic activities.

For the 30+ years since the founding of the People's Republic, the amount of water that can be supplied to Tianjin has steadily dwindled because of changes in the volume of water in the Hai He, the development of industrial production, and increases in the city's population, while the amount of water needed has grown by leaps and bounds. Comparing 1980 to 1950, the water used by the city's industrial production has increased 70-fold, and the amount of water used in the people's daily lives has increased 7-fold, but the amount of water used daily by the entire city has fallen from 1.8 million cubic meters to 700,000 cubic meters. And because of this, Tianjin is threatened by a water shortage, and industrial production in printing, textiles, electronics, paper manufacturing, chemical industries and machinery industries has already suffered losses to varying degrees. Entering the 1980s, the north China area had a continuing drought, groundwater was over-exploited, and the situation became increasingly grim. In August 1981, Tianjin had its most severe water shortage in half a century. Because there was no flood during the flood season that year, there was no stored water in over 10 large-scale reservoirs, such as the Miyun, Guanting and Beidagang reservoirs of the Beijing, Tianjin and Jidong areas. Particularly with the case of the Miyun Reservoir, which suffered from the worst drought in 50 years, the water level fell below the level for closing the dam, and so there was no water to supply Tianjin. Under these circumstances, the total volume of stored water for Tianjin was only 15

million cubic meters of bitter and salty water, enough to supply the city for only 10 days!

According to the calculations of concerned departments, using 100 million cubic meters of water in industrial production, Tianjin can create an output value of 4 billion yuan and can increase state tax revenues by 800 million yuan. If Tianjin's several thousands of factories were to stop production for a year, it would create direct losses of 20 billion yuan. The water shortage brought Tianjin's gigantic industrial production capacity and its 3.5 million people to a dangerous situation.

B. Shifting Water--The Party Central Committee's Valiant Decision

The early days of autumn 1981 were a time when the Tianjin area's 3.5 million people worried about water. At the same time, it was a fortunate time when the 3.5 people of the Tianjin area personally felt the concern of the party. That year, the party Central Committee and State Council repeatedly convened meetings to study Tianjin's water use and made a resolute decision: to rescue Tianjin from the water shortage emergency, water would be diverted temporarily from the Huang He, more than 1,000 li away, to help the city; to supplement Tianjin's water for the near future, one billion cubic meters would be rationed to Tianjin each year from the 1.95 billion cubic meters of water shifted and stored in the Luan He's Panjiakou reservoir. Then, they quickly carried out the survey and construction work for the project to divert water from the Luan into Tianjin.

To solve Tianjin's water problem, the Central Committee and the State Council studied many plans. In the early 1970s, when signs of drought were beginning to appear in north China and when the water used by Beijing, Tianjin and Tangshan was beginning to become scarce, Premier Zhou Enlai decided to accelerate the development of Luan He water resources. In 1973, with the approval of the State Council, it was decided to build the large Panjiakou and the Dahei Jiang reservoirs.

The Luan He originates at the foot of Beibayanguertu Shan in Hebei's Fengning County, has a basin area of 44,600 square kilometers, a mainstream 877 kilometers long and flows through the Nei Menggu Plateau, the Yan Shan Gorge in Chengde Prefecture, the mountainous zone in Tangshan Prefecture and then enters the Bohai in the vicinity of Dongting County on the Jidong Plain. The Luan He is one of the rivers of North China with the most abundant water; in most years the average discharge reaches 4.6 billion cubic meters. The river has little silt, a good quality and is an ideal water source for urban water supply. But because there is considerable inconsistency from year to year in the volume of runoff and the annual distribution of the Luan He basin, it was necessary to build a reservoir to transfer and store water, and only then would they be able to effectively supply urban water. The Panjiakou Reservoir, which acts as the general water source for the Luan He diversion project, is situated on the middle reaches of the Luan He in Hebei's Qianxi County, and the key project is composed of a broad-seamed, concrete gravity dam and power station, has a capacity of 2.93 billion cubic meters and controls over one-half of the total water of the Luan He. Work began in 1974, water began to be retained in 1979, and by now the main body of the project

has been completed. The Daheiting Reservoir, on the mainstream of the Luan He about 30 kilometers below the Panjiakou Reservoir, is the return adjustment and conservation reservoir for the Luan He diversion project, used to raise the water level and send water down to Tianjin and Tangshan. The key project includes a concrete gravity dam and power station, and has a capacity of 337 million cubic meters. Work began in 1973 and at present, the main project is complete. The basic construction of these two reservoirs provided the prerequisites for undertaking the project to divert water from the Luan and convey it to Tianjin.

In September 1981, the State Council made the project for diverting the Luan into Tianjin a key national construction project, gave financial and material guarantees, and also charged the city of Tianjin with full powers and responsibilities for surveying, planning and organizing the implementation of the project, instructing that "in construction, they must strive to do things scientifically, conscientiously do a good job in surveying and planning, guarantee the quality of the project and, under these conditions, do everything possible to accelerate construction. They must pay attention thrift and economy and strive to lower project costs." The valiant decision of the party Central Committee and the State Council greatly mobilized the enthusiasm of Tianjin's party, government and army. People ran about telling each other excitedly that "The source of the Luan diversion is at Panjiakou, but the source of power is at Zhongnanhai." The Tianjin party committee and the people's government of the city quickly deployed according to the Central Committee decision, and several million people of Tianjin took action. At the end of September, a meeting of the Standing Committee of the Tianjin Party Committee decided to immediately set up a project headquarters for diverting the Luan into Tianjin; within 3 months, more than 100 water projects were assigned to 67 construction units by the project headquarters for diverting the Luan into Tianjin; tens of thousands of workers, peasants, engineers, technicians, cadres of various levels and staff and officers of the People's Liberation Army who participated in the construction of the project gathered from all directions and left for the construction site.

C. Going All Out To Fight--The Heroes Who Diverted the Luan Performed Outstanding Service

There is a place, Sandunying, within Hebei's Qianxi County, that was a important strategic point during the Ming dynasty. At that time, the Ming general Qi Jiguang guarded the frontier, trained his troops and repaired the Great Wall there. Just as today, among the mountain peaks, hills and gullies for over 10 kilometers around Sandunying, green tents were lined up one after another, and construction blasts sounded without end. On 11 May 1982, the builders of the project to divert the Luan into Tianjin opened the curtain to begin work on all fronts.

The path the water will follow in the project to divert the Luan into Tianjin is: for the water to be drawn off from the Panjiakou Reservoir, then flow into the Daheiting Reservoir where the water level is raised, then down over its dam, diverting the water, through a key project to divide the water, through a tunnel, and then by way of the Li He, into the Yuqiao Reservoir in Jixian County where it is stored, and then again follow the Zhou He southward,

through Baodi County's Jiuwangzhuang diversion sluice, where it then goes through the open canal used only for water conveyance, and then after it has been raised three times and its pressure increased twice, the water is divided, with some conveyed through the Ming Canal into the Hai He, and some passing through covered culverts and steel pipes into the three city area water plants. The total length of the route is 234 kilometers. The scale of projects along the whole line was set on the basis of conveying one billion cubic meters for 7 months each year. A total of 215 projects had to be built, and of these, 113 were guaranteed to carry water before National Day in 1983. The project to divert the Luan into Tianjin included tunnels, pump stations, harnessing the river, digging canals, floodgates, culverts, inverted siphons, reservoirs, water plants, pipelines, bridges, etc. There were all sorts of projects and complex technology. The principle ones were:

--Two key water diversions projects, the "Tianjin Entry" and "Hai Entry (Xiang He)" sluiceways. The water diversion discharge of the Tianjin Entry sluiceway is 60 cubic meters per second, with 3 openings, each 2.5 meters wide; the Hai Entry sluiceway has a water diversion discharge of 80 cubic meters per second, with 3 openings, each 3.5 meters wide.

--Water diversion tunnels carry a discharge of 60 cubic meters per second, for a total length of 12.39 kilometers. Of this, there are 9.69 kilometers of excavated tunnel and 1.72 kilometers of open excavation. The clear width of the tunnel is 5.7 meters and its clear height is 6.25 meters.

--They dredged 108 kilometers of waterway, excavating 64 kilometers of open canals exclusively to convey water, which carry water at 50 cubic meters per second. They constructed 12 corresponding concrete and steel pipe inverted siphon projects, a total length of 3.35 kilometers, five culverts with a total length of 503 meters, and seven sluiceways.

--They built 26 kilometers of closed concrete culverts with double openings which carry water at 20 cubic meters per second (first completing 8 kilometers), laid 10.82 kilometers of steel pipe with a diameter of 2.5 meters and 3.73 kilometers of steel pipes with a diameter of 1.8 meters.

--Because the terrain for the open canals was flat, they could not rely on gravity for flow and so needed to construct five pump stations.

--They built one new water plant with a daily capacity for purifying water of 500,000 tons, and laid over 90 kilometers of water mains out of the water plant.

--They built one new reservoir with a capacity of 45 million cubic meters.

--They built three new transformer substations and erected 360 kilometers of communication lines.

The conservancy projects described above required 27.3 million cubic meters of earthwork, 1.4 million cubic meters of stonework, the pouring of about 800,000 cubic meters of concrete, had a total construction area of over 120,000 square meters, and required the installation over 2,700 pieces of equipment.

One of the most crucial battles in the project to divert the Luan into Tianjin was boring the water diversion tunnel. In the dead of winter in 1981, the officers and men of the 198th division of the 66th army and the 8th division of the railway troops of the PLA who shouldered this duty came from over 200 construction and training sites in 4 provinces and 2 municipalities, and dispersed at the foot of Jingzhong Shan in Qianxi County. In just 4 months, in icy days in the snow, they completed digging the inclined shaft and completed preparation work for the main hole's entrance. On 11 May 1982, they began construction work on the main hole and had completely finished the work by 14 July 1983, taking only 1 year and 2 months, which was more than 1 year ahead of the original plan. In the entire construction work, they drilled and blasted nearly 1 million times, passed through 357 faults and fracture zones, and pumped out over 4.7 cubic meters meters of groundwater. In excavating the tunnel, the numerous officers and men carried on with the revolutionary tradition and workstyle of creating good fortune for the people, bravely going all out, not fearing hardship and not fearing death, and many moving deeds emerged making people both sing and sob. One particular group ran into seven belts of weathering in succession in the construction, and because of successive cave-ins, four warriors bravely sacrificed their lives. The remaining people advanced wave upon wave, and several times, those mobilized did not leave the hole, and all the warriors signed a written pledge not to withdraw without completing the task, and in the end, they finally broke through the tunnel, and everyone embraced each other and wept.

At the same time that the tunnel to divert the Luan attained this important victory, the pace of construction for other projects was faster than estimated. They excavated nearly 10 million cubic meters of soil for over 60 kilometers of open canal and completed work in the estimated 5 months. The people of Tianjin, who had tasted to the full the bitterness of the water shortage, eagerly signed up for voluntary labor, and an army of 100,000 took only 52 days to complete the task; the construction cycle for four large-scale pump stations would normally take 3 years from earth work to installation, but it took only 1 year; for two 110-kilovolt transformer substations, whose construction period is usually one and a half years, the construction unit spared no effort and went all out, and took only 8 months to regularly transmit power; 12 kilometers of steel pipe passed through three city and suburban sites, with a lot tearing down and moving. Conventionally it would take at least 3 years, but it took only 2 months to complete construction preparations, and a half-year later, they declared the work complete.

On 11 September 1983, victory was reported in the project to divert the Luan into Tianjin! The seething spray of the sweet and clear Luan He follows the 100-li watercourse that was opened up through the diligent effort of people using their two hands and now pours into Tianjin municipality, which had long suffered from drought and water shortage.

Since the victorious completion of the project to divert the Luan into Tianjin, it can supply one billion cubic meters annually in normal harvest years, and so can supply a stable, dependable source of water to Tianjin, thus greatly alleviating the tight water situation for Tianjin municipality. During the summer and fall of 1983, Tianjin was dry and had little rain, and into the winter, not one drop of rain or one flake of snow fell. Had it not

been for the water from the Luan He, they would have had to divert water from the Huang He again. After they diverted water from the Luan into Tianjin, not only did they avoid diverting water from the Huang He, but it promoted the development of production, raised the quality of products and created the conditions for expanded reproduction. According to a preliminary survey in January 1984 by concerned Tianjin departments of 47 large bureau and company-level water users, after using Luan He water, each unit's output value increased, and the water consumption index for the units output value fell. Comparing the period between September and December in 1983 with the same period in 1982, the amount of water used by the No 1 Machinery Bureau's system increased 10 percent, output value increased 12 percent, and the consumption of water for each 10,000 yuan in output value fell 1.36 percent; water use in the Chemical Industry Bureau's system increased 5.5 percent, output value increased 4 percent, and the consumption of water per 10,000 yuan of output value decreased 1.5 percent; the amount of water used by the No 1 Light Industry Bureau's system increase 9 percent while output value increased 7.4 percent. And because of improved water quality, in printing and dyeing, the colorfastness of the dyes has generally increased between one-half grade and one grade, eliminating deficient and substandard products, and the ratio of first-grade products rose from 95 to 97 percent.

The sweet [gantian 3927 3929] water of the Luan He flows into thousands upon thousands of households in the Tianjin urban area, and based on this, Tianjin's people no longer drink salty water and living conditions have improved. Based on chemical examination, each of the quality standards for Luan He water is within the scope of national regulations, and the residents report that when drinking Luan He water, they no longer taste bitterness or harshness. According to statistics, not only did quality improve in 1983 vegetable production, but the amount that went to market increased nearly 300 million jin over the water shortage year of 1981, and moreover, they came to market 7 to 15 days earlier and increased economic results 10 million yuan.

The turn for the better in the Tianjin municipal water supply also effectively controlled the sinking of the land surface. After the Luan He was diverted into Tianjin, the city's 840 deep wells cut use by 15 percent, and in one year they were able to reduce groundwater use by 40 million tons. In 1983, the average amount that Tianjin sank was 70 millimeters, while in the water shortage year of 1981, the average amount it sank was 130 millimeters because of the over-use of groundwater. To sum up, diverting the Luan into Tianjin has already produced initial results, and with the development of production and the rise in living standards, results can only improve.

As a key national project and as the largest urban water supply project in the country at present, the project to divert the Luan into Tianjin has the features of a long route, many projects, large amounts, a tight work schedule, difficult construction, etc. Yet under the correct leadership of the party Central Committee, the State Council and the Military Commission of the Central Committee, with the help of various central government departments and the cooperation of 19 provinces, municipalities and autonomous regions, the brave people of Tianjin and the officers and men of the PLA, under the unified leadership of the Tianjin CPC Municipal Committee and of the Municipal People's Government, overcame one difficulty after another, and accomplished

within a short period the task of the Central Committee to bring through water as quickly as possible. Looking back at the construction of the project to divert the Luan into Tianjin, people can see:

The speed of construction for the project to divert the Luan into Tianjin was amazing. From the official start of construction until water began to flow took just 1 year and 4 months, 2 years ahead of the 1985 date suggested by the state.

The quality of the project to divert the Luan into Tianjin meets standards. Through technical inspection and checking midway through construction, the ratio of high quality projects reached 90 percent for separate projects; the proportion meeting standards for concrete strength reached 100 percent; and the proportion meeting standards for earth work dry capacity weight reached 96 percent; and all along the route, they moved water successfully on the first try.

Investment in the project to divert the Luan into Tianjin was also economical. Under the unified leadership of the Tianjin Party Committee, by carrying out the economic responsibility system with investment contracted down to the projects, some projects used volunteer labor, some project plans were rationally revised in line with the principles of thrift, new technology was spread, and non-construction expenditures were reduced, etc., so that the total investment was economical.

It is no wonder that the project to divert the Luan into Tianjin is a model for key national construction.

III. An Important Fundamental Facility in Capital Construction--The Jing-Mi [Beijing-Miyun] Water Diversion Project

Although Beijing has the large rivers of the Hai He basin, such as the Yongding, Chaobai, Wenyu, Beiyun, Jiyun and Juma, most are intermittent river courses, with large fluctuations between flooding and being dry. There is a lot of water every year in July and August, and sometimes it overflows creating disasters, but usually the flow is very small, and the large rivers are all fairly far from the city, so that diverting them into Beijing has become important to the existence and development of this large city.

Since the more than 800-year period when Beijing was the capital city for the Jin, Yuan, Ming and Qing dynasties, our forebears tried several times to open the Jinkou and divert the Ta Shui in order to resolve Beijing's water problem, and sometimes had some success. But because of the rapid flow of silt, it often led to disaster. To find a new water source, the famous scientist Guo Shoujing of the Yuan dynasty diverted water from the Baifu spring more than 100 li away in Changping County into Beijing, converging at Jishui Tan, and this engineering project has been called one of the most extraordinary accomplishments in the history of Beijing's water conservancy. However, the amount of water diverted was not great and technically, it did not overcome the problem of overlap between the canal and mountain floods, and was even washed out by big floods, repaired several times and finally abandoned.

In the early years after the establishment of the new China, the people's government placed Beijing's water problem on the agenda of important matters. In 1956 it constructed the Guanting Reservoir and the Yongding He diversion project that complements it, bringing the river water of the Yongding He into the urban area after it had been shifted and stored. However, this one water diversion system alone is far from adequate to meet the water needs for the capital city's construction, industrial and agricultural production and the ever-increasing amounts of water used in people's daily lives. The far-sighted and sagacious Premier Zhou Enlai personally went to Miyun County on 26 June 1958 to decide on a reservoir site for another rather large water source for Beijing, and approved the plan for the construction of the Miyun Reservoir. On 1 September of that year, work on the reservoir began, and after 2 years, in September 1960, they successfully stored water, and a large reservoir with a capacity of 4.37 billion cubic meters began to supply an important source of water to the capital.

The Jing-Mi water diversion project consists of a manmade main canal taking the water of the Chaobai He that has been stored in the Miyun Reservoir, a distance of 200 li from the capital, and diverting it into the urban area. The plan as first envisioned was to build a "Grand Jing-Mi Canal," with a bottom width of 80 meters and a width at the water surface of 100 meters, from the Miyun Reservoir to the southeast corner of the Beijing city wall, and which would link up with the long-term plan's "Jing-Jin Canal." This plan consumed a lot of water, took up a lot of land and required a big investment; the earthwork and stonework alone required 80 million cubic meters and would not be easy to bring to fruition. In 1960, in line with the national financial situation, Beijing Municipality decided to make water diversion the

primary item while also giving attention to small craft navigation, and so the bottom width of the canal was reduced to 20 meters, and because the upper section had a steep slope and rapid current, they did not consider navigation. The new plan, then, was the "Jin-Mi Water Diversion Project," and both the number of projects and the amount of land needed was reduced by more than 80 percent from the original grand plan.

The construction of the Jing-Mi water diversion project underwent two stages. The first phase of construction began in the early winter of 1960. At that time the north China area was dry, and at the end of the rainy season there were only 300 million cubic meters of water stored in the Guanting Reservoir, only enough to provide not much more than 100 million cubic meters of clean water. And yet each month more 50 million cubic meters of water were needed to maintain the capital industrial production and power generation by the heat and power plants, in addition to the water needed by the agricultural vegetable fields of the nearer suburbs and by the city's rivers and lakes, and even if some more water did come from the reservoir, it would have been difficult to spread it out over a year's use. To quickly resolve this problem, plans for the Jing-Mi water diversion project were approved by the State Council and then ground was broken and work began. A large army of 50,000 volunteer laborers composed of municipal government, construction, commercial workers and concerned cadres began work in November 1960, heeding neither wind, snow, bitter cold nor the difficult living conditions of the time, going all out, fighting the severe winter, digging the frozen earth, blasting solid stone, building bridges and constructing sluices, they took only 150 days to complete the 53-kilometer-long main canal of the upper section between the the Miyun Reservoir's regulating pool to Cui Village; they also completed a lot of earth and stone work and many construction projects. In April 1961, just as the project was proceeding, the water brought by Guanting's winter and ice run was greater than the estimate at the beginning of the year, and they calculated that it could be spread through that year's use; in view of the fact that the supply conditions for living did not suit the depletion of physical labor of a large army of labor, Beijing decided to halt construction. Five years later, north China experienced another drought, and the Guanting Reservoir again had insufficient water, and with the further new development of Beijing's agriculture and industry, water use increased even further. Beijing Municipality decided to continue construction of the Jing-Mi water diversion project, to rapidly divert the water into Kunming Hu. On 10 October 1965, work began on the second stage of the project. In early March 1966, the project for the 57-kilometer Xin He and the 53-kilometer renovation of the old route was basically completed. But to do an even better and more beautiful job on this great project with historical significance, all of the personnel who took part in project construction extended for more than 20 days, repairing banks, straightening up discarded soil, filling in hollows and creating level land, constructing an "August First Lake," building a swimming area along the river course, building a major riverside road 110 kilometers long, planting trees, creating forests and greenifying both banks. In early April 1966, the whole route succeeded on its first trial. The high quality and rapid pace of construction, economy of investment, rapid wind-up and cleanliness of completed work sites were all seldom seen in earlier Beijing Municipal water conservancy construction.

Now the route of the Jing-Mi water diversion project is up from the Miyun Reservoir's regulating pool, along the Guibai He's irrigation canal route into the Huairou Reservoir; through further adjusting by the Huairou Reservoir, exiting the reservoir through Fengshankou and south to Lishi Shan, then west again across the divide of the Hubai and Wenyu rivers, through Changping's Cui Village and Yangfang, then turning south again, and along the Haiding hot springs into Kunming Hu. After it leaves Kunming Hu at Xiuyi Bridge, it arrives at Beijing's western suburbs and joins with the Yongding He water diversion project at Yuyuan Tan, and then converges at Hucheng He in the urban area. The entire route passes by the highlands at the northern foot of Yan Shan and transverses five counties and prefectures. The total length is 110 kilometers and along the way it intersects with branch rivers of major river systems at many places, crosses 10 major highways and railroad trunk lines, and altogether, about 300 large and small bridges, sluices, culverts, water drops, aqueducts, inverted siphons and other water conservancy structures were built, along with over 30 kilometers of impervious liners. About 17,000 cubic meters of earth were used at a total investment of 53 million yuan. The discharge capacity of the upper section is 70 cubic meters per second, 40 cubic meters per second at the lower section. Along with the Guanting Reservoir and the Yongding He diversion project, these form the two main projects for supplying water to the capital and are important fundamental facilities for capital construction. Viewing the entire project from the air, one sees only one long river of clear blue water with fine waves like fish scales, from northeast to southwest, twisting and coiling forward from Yan Shan, flowing to Beijing's western suburbs, then suddenly widening into the He Hai with a myriad weeping willows lining both banks, just like a green Great Wall screening the capital's outer suburbs, and like a scenic picture scroll, sketching out an unending landscape for Beijing.

The completion of the Jing-Mi diversion project brought about preliminary control of the drought and waterlogging disasters for Beijing and the north China area, and the realization of overall development and utilization through flood prevention, irrigation, power generation, greenification, and water supply for the city's industry and daily life. In 18 years, it has brought over 8 billion cubic meters of clean water in a steady stream into areas of the capital that need water. It links up with the Guanting and Yongding He diversion projects, which adjust each other and each year nurture 2 million mu of rich farm fields and vegetable land; various hydroelectric, heat and power, iron and steel, and chemical stations and plants all rely on them in order to engage in regular production; the city has already constructed eight waterworks and laid water mains reaching large roads and small lanes; the peak water supply each day has increased from 38,000 tons just after the establishment of the People's Republic to 1.5 million tons. And each year the capital city's parks and the banks of its rivers and lakes will receive nearly 30 million cubic meters of clean water as a supplemental water supply in order to maintain the purity of water quality and the beauty of the environment.

Since the 3d Plenum of the Party's 11th Central Committee, there has been new improvement in the lives of Beijing residents, and with the rapid growth of new multi-story building complexes at a rate of 1 billion square meters a year, the supply of running water in the city has become very tight. The Miyun Reservoir and the Jing-Mi diversion project will bear the brunt of

supplying 300-500 million cubic meters annually to water plants to resolve this problem. According to the spirit of the "written reply" of the capital's overall plan and the Central Committee's four construction objectives for the capital, the Jing-mi diversion project will add new lustre and will play an ever-increasing daily role in the utilization of capital construction to make a clean, beautiful and economically prosperous city.

IV. Diversion Irrigation in the Lower Reaches of the Huang He

In the more than 30 years since controlling the Huang He, at the same time that the people of the two banks of the Huang He's lower reaches have won victories in the flood prevention struggle, they have actively utilized the Huang He's water and soil resources and developed irrigation by diverting the Huang He, placed silt to improve the soil, and attained great accomplishments, thus promoting agricultural production in the area.

There have been several stages in the development of irrigation by diverting the Huang He:

Pilot project: In 1951, they began building the People's Victory Irrigation District in Henan, and developed irrigation by diverting the Huang He. After one year's valiant struggle, water was released in April 1952, and that year they irrigated an area of 360,000 mu. In October of the same year, Comrade Mao Zedong examined the headway of the People's Victory Canal project, and encouraged the people of the lower reaches. And even though they suffered from very severe natural disasters in 1953, grain and cotton yields far surpassed those of the best harvest years prior to irrigation. Irrigation by diverting the Huang demonstrated its awesome might.

Afterward, they continued to construct Shandong's Dayuzhang irrigation district and Henan's Huayuankou and Heigangkou projects for irrigating by diverting the Huang He. The construction and application of the projects was quite cautious, following natural conditions and technical requirements as much as possible, and doing further construction only after scientific trials. Seen from the results, it was quite successful, forming a model irrigation district for the lower reaches through irrigation by diverting the Huang He.

Sudden increase: From 1958 to 1961, irrigation by diverting the Huang He developed very quickly, and in 1959, the amount diverted reached 16.6 billion cubic meters, and the amount of silt diverted reached 640 million tons. Yet because they did not follow science and technology by using the drainage ditches and rivers as irrigation canals to transport water diverted from the Huang He, considering only diversion and not drainage, one plot of land faced one plot of sky and steadily retained water, a large amount of mud and sand silted up the canal and river, making inland waterlogging more severe, dangerously raising the level of groundwater, and creating secondary salinization and alkalinization of a large area of cultivated land.

Stopping irrigation: From 1962 to 1965, inland waterlogging and widespread salinization and alkalinization taught them a profound lesson; they had to close the sluice gates and halt irrigation, and left only a little over 200,000 mu area served by the People's Victory Canal. They turned to draining waterlogging and controlling alkalinization with all their strength, dug out many drainage ditches, dredged a main drainage course and opened up a way out for drainage water, making the groundwater level drop rapidly. They also energetically developed experimental research into the prevention and control of soil salinization and alkalinization, and over the years the saline-alkali land has been reduced. Through state financial assistance, they developed irrigation with motor-pumped wells and recovered their agricultural

production. Experience told them that it would be impossible to develop irrigation by diverting the Huang He on a plain without doing a good job with drainage projects.

Renewed irrigation: Since 1965, the projects to drain waterlogging and control alkali were prominent, and secondary salinization and alkalization were basically eliminated. But with the demands of agricultural development, drought once again reared its ugly head. Rainfall and groundwater sources did not satisfy the water requirements for crop growth, so they were forced to return to irrigation by diverting the Huang He. Thus the people along the Huang He spontaneously renovated and rebuilt the Huang He diversion project and adjusted the irrigation district, and the irrigated area has increased over the years. On a foundation of investigating, studying, and analyzing these experiences and lessons, they proposed a plan for actively and cautiously developing irrigation by diverting the Huang He, and irrigation by diverting the Huang He developed stably. Particularly since 1980, they have reviewed and analyzed their experiences many times, dredged the irrigation district, strengthened management, planned well and developed research, and the face of the irrigation district has improved greatly.

At present, they have built a total of 72 culverts and sluices for diverting the Huang He on its lower reaches (33 in Henan and 39 in Shandong), 55 inverted siphon projects, 153 pipes (37 at 16 locations in Henan and 116 at 39 locations in Shandong), and have planned a total diversion capacity of 4,700 cubic meters per second. At present, the capacity of the culverts and sluices for diverting the Huang He are not even 3,000 cubic meters per second. The plan is divided into roughly 90 irrigation districts (25 in Henan and 65 in Shandong), and among them are 21 large-scale irrigation districts of 300,000 mu and more (7 in Henan and 14 in Shandong), controlling 27.9 million mu of irrigated area (10.9 million mu in Henan and 17 million mu in Shandong) and involving 13 prefectures (municipalities) and 58 counties.

Since 1973, they have used the Sanmenxia Reservoir to reduce the menace of ice run, and each spring they store 1.2 to 1.4 billion cubic meters of water, thus increasing the amount of water for the lower reaches in May and June by about 200-400 cubic meters per second, and alleviating the contradiction between running water that comes by and water for irrigation. The average amount of water diverted from the Huang He is 9.2 billion cubic meters (3.4 billion for Henan and 5.8 billion for Shandong), and the amount of diverted silt is 179 million tons (38 million tons of silt between January and June), and the average drought control irrigation area is 18.61 million mu (5.04 million mu in Henan and 13.57 million mu in Shandong). Within the irrigated districts, the actual irrigated area is 12 to 16 million mu (3 to 5 million mu in Henan and 8 to 12 million mu in Shandong). And each year they also supply water to fight drought for 3 to 8 million mu outside the irrigation districts.

Areas along the lower reaches of the Huang He are in a semi-arid region and the rainfall that can effectively be utilized meets only one-third of the need. There have been repeated droughts in the past few years and irrigation by diverting the Huang He has played a prominent role in agricultural production.

In 1982, 10.6 billion cubic meters were diverted from the Huang He to an irrigated area of 25.8 million mu. According to statistics for 13 prefectures (and municipalities) along the Huang He, total grain yield in 1982 was 39.2 billion jin, a 96-percent increase over the 20 billion jin total yield in 1965 before returning to irrigation by diverting the Huang He, and an average annual increase of 6 percent. Total cotton yield was 2.01 billion jin, a 3-fold increase over the 500 million jin total yield before returning to irrigation by diverting the Huang He. Total wheat yield was 17.7 billion jin, an average annual growth of 8 percent.

From a survey of irrigated districts in Shandong's Heze Prefecture, when wheat was irrigated one time early in the season, the per-mu yield was 400 jin, when irrigated twice (once early in the season and again at the jointing stage) the per-mu yield was 500 jin, and when irrigated 3 times (once early, then at the jointing stage and again when it ripens) the per-mu yield was 650 jin, so that an average of one irrigation can increase yield 100 jin. An analysis of a model year in Dezhou Prefecture found that prior to diverting the Huang He for irrigation, the rainfall from January to May 1968 was 51.6 millimeters, and the total wheat yield was 266 million jin, or 54 jin per mu. After irrigating by diverting the Huang He, the rainfall from January to May 1974 was 42 millimeters, but during the year they diverted 1.17 billion cubic meters of water from the Huang He, and the total wheat yield was 892 million jin, a 626-million-mu increase, or 2.4-fold increase over 1968; the per-unit yield was 153 jin, a 99-jin increase over 1968. In Henan's Nanxiaoti irrigation area, they irrigated 420,000 mu and the per-unit grain yield was 530 jin, a 150-jin or 2.5-fold increase over the yield prior to diverting the Huang He. Six years after diverting the Huang He, Yuanyang County had an average annual total grain yield of 400 million jin, an average annual increase of 153 million jin, or 1.6-fold, over the 3 years before diverting the Huang He, and in the 15 years since diverting the Huang He, the average agricultural output value was 59.1 million yuan, a 41.55-million-yuan, or 237-percent, increase over before diverting the Huang He, and an average annual rate of growth of 14.3 percent.

The People's Victory Canal irrigation district was the earliest irrigation district built by diverting the Huang He in its lower reaches, the historical old route of the Huang He, with very severe drought, waterlogging and saline disasters. This irrigation district is mainly one where the water flows on its own, and now controls an 880,000-mu area. The irrigation district project has complete sets of parts, with the canal route and the drainage ditches each forming systems, with canal and well irrigation complementing each other. The land is flat, and the main water conveyance canals have linings, attaining a high standard of completeness, and basically bringing about a situation of having water even in drought and draining when waterlogged; each year they divert 600-700 million cubic meters of water. The grain yield has increased from 177 jin per mu before the irrigation to 1,128 jin in 1982; per-mu cotton yields increased from 29 jin to 100 jin.

Hongmen Commune in the irrigated district's Xinxiang County has 430,000 mu of cultivated land, and of this, 380,000 mu was formerly saline-alkali land. In line with the principle that salt comes with water and goes off with water, they adopted measures for irrigation, drainage, leveling and fertilizing, used

large amounts of water to drench the alkalinity, and deep ditches to drain salty water. By bringing the situation under control, in 1971 the total grain yield was 17.85 million jin and cotton was 1.06 million jin, increases of 7.69 or 132 percent and 400,000 jin or 165 percent, respectively, over pre-control figures. Since 1978, per-mu grain yields have consistently surpassed 1,000 jin.

The Wei Shan irrigation district located in Shandong's Liaocheng Prefecture received 700-800 million cubic meters of water diverted from the Huang He each year for an irrigated area of over 3 million mu, and then another 600 mu. In 1982 the average per-mu yield for grain was 877 jin, with a total yield of 1.571 billion jin; for cotton the per-mu yield was 114 jin, with a total yield of 315 million, 2- and 4-fold increases over pre-irrigation figures.

In the early 1970s Shandong's Dezhou Prefecture built three large-scale irrigation districts by diverting the Huang He, and adopted separate installations for irrigation and drainage, with low canals for conveying water, scattered prevention irrigation, deep ditches for draining alkalinity, graded grit and sending in water to combat drought. In 1982, under continual dry conditions, they diverted 2.13 billion cubic meters of water from the Huang He to an irrigated area of 6.71 million mu, bringing a total grain yield of 3.75 billion jin, an increase of 1.93 billion jin over the 1.82 billion jin before irrigation, and an average annual increase of 8 percent. The total cotton yield was 4.35 million dan, an increase of 3.61 million dan over the 740,000 dan before irrigation, or an average annual increase of 38 percent. The total wheat yield was 1.73 billion jin, a 1.2-billion-jin increase over the 470 million jin before irrigation, and an annual increase of 21 percent.

In the belt of low-lying saline-alkali land along the Huang He, changing to paddy rice cultivation is an effective measure for increasing yield. For example, the Huayuankou irrigation district of Zhengzhou city and the Heigangkou irrigation district of Kaifeng City in Henan's Yuanyang County adopted the planting of paddy rice in silted land, deep irrigation and improving soil, attaining marked results in increased grain yields. Yuanyang County adopted the method of planting paddy rice on land that is silting up; each year, the silt grows by 0.1-0.2 meters, increasing fertility. They have already developed 200,000 mu of paddy rice, have two harvest seasons, first for rice and then wheat, and the per-mu yield for grain has grown rapidly from 20 to 30 jin per mu up to over 800 jin per mu.

Utilizing the silt deposited by the Huang He to improve the soil is an effective measure that the masses like. The provinces of Henan and Shandong have already improved over 3.1 million mu. The masses handle small-scale silt placements themselves, and these have sprung up everywhere. And the state is handling large-scale placement of silt in an area of 600,000 to 800,000 mu. Placing silt ses the alkali and controls the sand. The water and soil of the Huang H ain a lot of organic matter and nitrogen, phosphorus and potassium, e , and by placing silt once, per-mu yield can be increased 400 jin or more. According to a survey of Kaifeng City's suburbs, putting down 0.1 meter of silt can increase nitrogen per mu by 5.8 to 8.2 jin, phosphorus by 3.2 to 4.1 jin, potassium by 40 jin, and organic matter the equivalent of

1,000 kilograms of grass and manure. Silting changes the soil structure and raises its capacity to retain moisture.

Shandong's Heze Prefecture borders the Huang He for over 200 kilometers, and most of this is barren land of alkali sand and waterlogged lowlands. In recent years, they have energetically diverted the Huang He and put down silt, using 10 culverts, sluices and inverted siphons, and have already deposited silt on 1.09 million mu, which is 67 percent of the land suitable for silting. The general per-mu yield is 300 to 500 jin, with the highest over 800 jin. The masses say: "If you want to think of changing, then irrigate and bring in silt, and exchange your thatch shacks for brick homes, and your lives will greatly improve." At the same time, it has changed the situation of "wind storms filling the sky, planting without reaping a harvest, the large dikes lasting year after year, and the land surface sinking year after year."

At the same time that they developed irrigation by diverting the Huang He to raise agricultural production, they also supplied abundant water for industrial use and for the daily lives of the people in the cities along the Huang He. In 1982, the cities of Dengzhou, Xinfeng and Kaifeng in Henan diverted 370 million cubic meters of water from the Huang He, one-third of the cities' total water supply. In Shandong, it supplied 280 million cubic meters of water for the Shengli oil fields, the Zhanhua power generation plant, Xiaoqing He navigation, and for daily life.

They have sent 1.91 billion cubic meters of water from the Huang He into Tianjin to help solve that city's problem of water for industrial use and for daily life.

There have been a lot of accomplishments in diverting the water of the lower reaches of the Huang He for irrigation, but many problems remain. On the foundation of reviewing and analyzing our experiences, from now on we must plan comprehensively, allocate water resources rationally, open up outlets for draining water, hasten completion of support projects, control water and silt diversion, reduce receding water and receding sand, prevent the silting up of ditches and rivers, eliminate potential dangers, avoid repeating the lessons of history, strengthen the administration of irrigation districts, and raise the efficiency and economic results of water use. Actively and cautiously develop irrigation by diverting the Huang He so that the water and soil resources of the Huang He will play an even bigger role in industrial and agricultural production along the Huang He.

V. The Flourishing Development of Yantai's Farmland Water Conservancy

Yantai City is on the Jiaodong Peninsula, surrounded on three sides by water, with many, many mountains. The total land area of the city is 18,900 square kilometers, with 11.23 million mu of cultivated land, and three-fourths of its area is mountainous or hilly. The city is divided into 2 districts, 12 counties, and one administrative city, and has a total population of 8.1 million.

In the past, there were frequent disasters and the people lived in dire poverty. According to records, there were serious droughts or floods in 205 of the 300 years prior to Liberation and the working people have had their fill of the bitterness caused by floods and droughts. The birth of the new China and the establishment of the socialist system allowed the people of the Jiaodong Peninsula to realize their long-cherished wish of building water conservancy projects and bringing floods under permanent control. Under the leadership of the party and government, they relied on their own strength, fought bitterly, and began a great struggle with nature that unfolded on a magnificent scale, and so wrote a new chapter in farmland water conservancy construction:

--The number of water conservancy projects increased from 29 just after the establishment of the People's Republic to 67,811.

--The irrigated area increased from 560,000 mu just after the establishment of the People's Republic to 6.841 million mu, an 11.2-fold increase.

--The amount of land susceptible to waterlogging was reduced from the past 3 million mu to 300,000 mu, a 90-percent reduction.

--The amount of water supplied to industry increased from 150,000 cubic meters in 1949 up to 150 million cubic meters, a 1,000-fold increase.

--They have solved the water shortage difficulties of 478 villages and 360,000 people; 397 villages and 95,000 peasant households now use running water; and 3,110 villages and 673,000 peasant households and public offices are now outfitted with hand-pumped wells.

--Now, 7.5 million mu of farmland have reached a high standard of renovation; they have constructed 5.8 million mu of farmland that is protected against drought and waterlogging and with stable high yields, or a per capita average of 0.79 mu.

With the changes in production conditions, the city's industry and agriculture have developed rapidly, and living standards have risen steadily. In 1983, the per-unit yield for grain in the city reached 1,141 jin, a 10.1-fold increase over that of 1949; the total yield was 8.23 billion jin, and when the grain field area was reduced 4.2 million mu, total yield increased 3.5-fold; the total peanut yield was 1.49 billion jin and total fruit yield 1.58 billion jin, 4.8-fold and 17-fold increases, respectively, over 1949; the industrial output value reached 4.66 billion yuan, a 95-fold increase over 1949; the total industrial and agricultural output value reached 9.35 billion yuan, a

22.8-fold increase; the per capita income for peasants was 448 yuan, an 8-fold increase over 1949, and the per capita income of people in one-seventh of the villages exceeded 600 yuan, and for 77 villages (including 28 farm villages and 49 fishing villages), it exceeded 1,000 yuan.

In the Yantai of today, beautiful and richly endowed scenes of prosperity have appeared everywhere and the area has already become a major commodity production base for grain, peanuts, fruit and aquatic products. The broad masses have seen earthshaking changes with their own eyes, and have deeply experienced the fact that only with the correct leadership of the party, only by relying on the superiority of the socialist system, and only by resolutely carrying out water conservancy construction for farmlands, could this wonderful situation have appeared in the Jiaodong Peninsula.

Since the establishment of the People's Republic, the broad masses and cadres of Yantai have proceeded from local natural conditions in their water conservancy work, resolutely stored water and dug canals, controlling both water and soil, and brought comprehensive control to mountains, rivers, fields, forests and roads, undergone the various stages of reservoir construction, river control, ground levelling, well digging, and so on, one after another, going the route of water control and soil improvement that has been both tortuous and effective.

A. Construct Reservoirs and Embankments, Cage the Flood Dragon

Yantai has more than 190 mountain peaks that are 500 meters or more above sea level, and more than 19,000 mountains, large and small. Mountain slopes are steep and the rivers are short and run swiftly. In most years, the average rainfall is 718.9 millimeters; 70 percent of the annual rainfall is concentrated during the flood season. If there is a heavy rain, flood waters overflow; and once the flood season has passed, it is dry again with a water shortage. During the latter part of the 1950s, they built 5 large reservoirs, 34 medium-sized reservoirs, 1,591 small reservoirs and 10,310 dikes, with a total reservoir capacity of 2.8 billion cubic meters. Not only could it reduce the flood peak discharge by three-fifths and combat widespread flood disasters, but also brought the benefits of irrigation to over 3.36 million mu of land, and over 41 irrigated districts of 10,000 mu or more. Jiaodong's highest peak is Kunyu Shan in the eastern part of the peninsula. For a long time, the turbulent water that thunders down from the mountain made a 58-kilometer-long river at the southeast foot of the mountain, and over 30,000 mu of land on both banks were badly flooded with a big rain, and flooded a little with a little rain. In 1958, Wendeng County organized more than 30,000 people to pitch in and build a large reservoir with a holding capacity of 300 million cubic meters on the middle reaches of the river, got permanent control of floods, and also converted 210,000 mu of dry land in 190 villages in 8 townships to irrigated land, raising the per-mu yield for grain in the irrigated areas from the 300-400 jin of the past to over 1,300 jin.

Throughout the innumerable mountains and valleys of the Jiaodong Peninsula, clear blue ripples can be seen along dikes. Each large grand dike seems like a wall of steel, firmly locking up the tempestuous "flood dragon;" each

winding, coiling canal is like a gifted pen writing down the great undertaking of the working people's brave struggle with nature.

B. Control the River, Eliminate Flooding and Waterlogging

"Mountain waters are a dragon, and we must begin with the rivers, but if we build reservoirs and do not control the rivers, all our work will be for nought." This was the realization of the people of the Jiaodong Peninsula regarding nature in the process of bringing the river under control. After they constructed water storage projects for the city's 5,400 large and small rivers, even though they had controlled large floods, because river dikes are in disrepair and the river bed has silted up, in some parts, flooding and inland waterlogging are still quite severe. At the time of a heavy rain in 1964, rivers in the city were breached at 1,600 points, 1.584 million mu of grain fields were flooded and 34,666 buildings were destroyed. To bring about the permanent control of flooding and waterlogging disasters, in the late 1960s and early 1970s they concentrated on controlling rivers and eliminating waterlogging.

The Huangxian plain is Jiaodong's vast, fertile granary, and the Huangshui He whose origin is in the Qixia mountainous district, crosses through the plain. In the 10 years between 1949 and 1958, it partially breached its banks 6 times; the worst time, it breached it in 8 places, inundating 73,000 mu of land, and not a kernel of grain was harvested. In spring 1974, 50,000 people pitched in and from upper reaches to lower reaches, on both banks, with unified standards and coordinated actions, making use of the momentum of large bends and straightening out small bends, digging deep river channels, building high embankments, carrying flood water and draining waterlogging, they brought the river under overall control. They fought bravely for 45 days, putting in over 2 million man-days, moving over 4.2 million cubic meters of earth and stone, draining water from 80,000 mu, creating 3,000 mu of land. Since being brought under control, the Huangshui He has already been through five trials by fairly heavy rains, and it has ensured the safety of the grain fields and the villages on its two banks. The city's 1,200-plus dangerous waterways have all adopted the same method as Huangxian of bringing one river under control and one plot of waterlogged land under control at a time, and all have been brought under control. They have eliminated potential waterlogging in 1.2 million mu and promoted the development of agricultural production.

C. Prepare and Improve the Soil, Raise Fertility

Scattered parcels of land and poor soil prevent water conservancy facilities from playing their role to the fullest. Since the 1970s, at the same time that people have brought the river under control, they have also put a lot of energy into preparing and improving the soil and so carried out a system where the water and soil complement each other. Mountainous areas use Xiadingjia Village of Huangxian as a model. It has comprehensive plans for mountains, rivers, fields, forests and roads, and has harnessed them comprehensively, making a framework for roads and canals, making terraced fields that encircle mountains, bringing water in as far as they have prepared the soil, and planting trees wherever they have built roads. They energetically built

terraced fields of a high standard that have a deep layer of topsoil, level land, solid dikes, and that can drain and irrigate and protect both water and soil. In flat areas, they stress the Penghuangye Plain, and have built vegetable garden-style farmland of a high standard with drainage and irrigation complemented by roads and trees, and have attained flat land, with canals as the key link, combining roads and trees, level land and a friable layer of soil more than half a meter thick. In low-lying, waterlogged land, they have made the river the key link, a network for both drainage and irrigation, changed to paddy rice cultivation in the lower areas and built raised fields in the higher areas, they can irrigate in drought and drain when waterlogged, while the groundwater level can be controlled at one meter or lower. Between 1970 and 1979, the city prepared 500,000 mu or more every year, 800,000 in the best year. There are mountains and hills throughout Zhaoyuan County, with many mountains and poor soil. To raise fertility, the county has unremittingly prepared and improved the soil since 1975, carried out deep turning and levelling of 830,000 mu of cultivated land, making the friable layer of soil 60 millimeters deep or more, and brought the "semi-waterlogged" condition of the terraced fields under control. 1983 was the county's 8th year of continual drought, with only 394 millimeters of rainfall, but because the "soil reservoir" played its role, they achieved a bumper harvest in a year of bad drought, with a per-mu yield of 1,020 jin for grain, 370 jin for peanuts, a total yield of 108 million jin for fruit, and a per-capita income of 412 yuan, the highest ever.

D. Dig Deep Wells, Subdue the Drought Demon

Since 1977, there has been a continuous severe drought in the city, and the annual rainfall has dropped from 744 millimeters to 532 millimeters; the reservoirs are dry, the rivers have stopped flowing, and above-ground irrigation water resources are extremely scarce. To overcome the drought and guarantee increased agricultural production, the people of the city shifted the primary emphasis of water control from water storage to exploiting groundwater. In the beginning, they opened up small wells, but because little water came out, they were dry after being drawn once; next, they sank deep wells, but because the deep strata have no water, this, too, failed. Haiyang County summed up these experiences and lessons, and taking into account the fact that there was much water in the shallow strata, they adopted the method of opening up large-mouthed wells and enlarging the section that water came up from, and so carved out a new route. Among the large-mouthed wells that they excavated, the smaller ones have areas of 2 to 3 mu, while the larger ones have areas of 10-plus mu or several dozen mu, combining seepage and storage, with abundant water and clear results. Liuge Village opened up a large well of 11 mu, which ensures irrigation for an area of 6,400 mu. In the past 4 years, they have constructed over 1,200 large-mouthed wells on sandy land along both sides of rivers and ditches, old river courses, shoals, and so on, and expanded and improved irrigation on 210,000 mu, which is equivalent to the sum total of the irrigated area developed in the 30 years since the People's Republic of China was founded.

Today, the city's irrigated area is 3,257,000 mu; they have constructed a preliminary irrigation system of reservoir water to irrigate the mountains,

river water to irrigate the plains, and well irrigation on the plains, and the irrigated area is already 61 percent of the total cultivated area.

Three-fourths of Yantai's cultivated land is on mountain slopes. To increase the yield of grain and cash crops, they have quickened the pace of pumping station construction in the past few years and have simultaneously developed sprinkler irrigation, thus forming a coordinated four-part mountain irrigation system of "digging, pumping, storing and sprinkling," through large-mouth wells at the foot of the mountains, pumping stations halfway up the mountains, water storage pools on the mountain tops and sprinkler irrigation through natural pressure. There has been a substantial increase in yields for cash crops like peanuts and fruit.

The people of Jiaodong with their glorious revolutionary tradition fought tenaciously for more than 30 years to change the natural appearance of the peninsula, and water conservancy construction for farmland has moved forward steadily. The guiding principles and policies formulated by the 3d Plenum of the 11th CPC Central Committee greatly motivated the enthusiasm of the peasants and they again began an even more effective all-out struggle against nature with a new bearing, new pace and new boldness of vision, and water conservancy construction for farmland entered a new stage.

After agricultural comprehensively implemented the responsibility system of "unified, specialized contracts," they reformed the past way of doing things through "mass mobilization campaigns" and adopted the construction style of "specialized brigades contracting all year long, crash contracts for water conservancy work, impromptu contracts by thousands of families and households, and large-scale voluntary contracts by bidding." First, they organized more than 4,200 specialized water conservancy brigades who do water conservancy project construction all year long, contracting for projects with a high degree of difficulty and which require a high level of technical skill. And these specialized brigades have already become the main force in the city's control of mountains and water. Next, they stipulated that every laborer must complete 20 to 40 work-days per year in water conservancy work, in line with the slack labor season for peasants, and that these people would be centrally dispatched for use by the collective. In each winter and spring season, 500,000 to 600,000 of the city's laborers were engaged in water conservancy construction. And further, the peasants contracting land would arrange their own time, according to the agricultural season and the central plan, and carry out soil preparation and improvement, constructing canals and small wells in the fields, etc, with each constructing himself, managing himself and receiving the benefit himself. Fourth is that "capable people" took the lead, broke down administrative barriers, organized labor, invited bids for contracting water conservancy project construction, formed new associations, and raised the economic results of water conservancy.

Upholding the principle of self-reliance as primary and state assistance as supplemental, relying on the masses and collecting their own funds to construct projects--this is the line of successful experience of Yantai City in water conservancy construction. In the 35 years since the People's Republic was founded, the city's total investment in water conservancy was 1.42 billion yuan, and of this, funds collected by the local counties and

villages amounted to 1.114 billion yuan, or 78.4 percent of the total. In the 5 years since the 3d Plenum of the 11th CPC Central Committee, the enthusiasm of the masses for doing water conservancy work through self reliance has grown even greater, and the city's counties and villages have collected 420 million yuan, or 86 percent of the funds for water conservancy during that period. There are 89 villages and townships that have put in 200,000 yuan or more annually, or one-third of the total number of villages and townships; there are over 2,330 villages that have put in over 20,000 yuan per year, or one-fourth of the total number of villages. The broad masses have tremendous zeal for investing in water conservancy because they have deeply felt through personal experience the fact that water conservancy has numerous benefits. According to a survey by concerned departments, since the founding of the People's Republic, the results of the city's irrigation alone has increased grain yield by 23.29 billion jin and output value by 2.7 billion yuan, and after deductions for the total investment in water conservancy, the net increase in output value was 1.28 billion yuan.

Conscientiously strengthening technical leadership and maintaining high standards, high quality and high results in projects is an outstanding feature of Yantai's water conservancy construction for farmland in recent years. They organized various kinds of technical service companies for water conservancy in line with the demands of the new situation, started consulting businesses and adopted the methods of training classes and technical lecture series to train technical mainstays, spread water conservancy technology and guided the masses in carrying out water conservancy construction. The city has already trained over 11,000 peasant technicians. Various areas have begun overall activities for achieving excellence to seek results in water conservancy construction projects for farmland through high quality. In recent years, 762 projects have been praised one after another for their excellent quality by central, provincial or city water conservancy systems.

Strengthening project management, boldly reforming, being brave in breaking new ground and giving full play to project results--these have been the focal points of Yantai's water conservancy work in recent years. For large and medium-scale projects, they have issued separate task objectives and carried out specialized contracts; for small-scale projects, they have put into practice the large-scale contract administrative responsibility system and developed specialized water conservancy households and new economic associations. There are already over 6,750 specialized water conservancy households in the city, and they have organized 420 irrigation service companies of various kinds, and preliminarily realized the specialization of water conservancy administration, socialization of service and commercialization of management. The brigades of Penglai County's reservoirs and reservoir districts have formed associations, with the reservoirs supplying funds, facilities and technology and the brigades supplying workshops and labor; they have started up a vane casting plant that earned over 40,000 yuan by the year's end. For good administration and to give full play to the projects results, Yantai city has conscientiously carried out reform of water fees. They have adjusted water fee standards for various projects, according to cost structure and by checking water fees; they changed the former method of collecting fees after water was released to selling water chits in advance, and supply water based on the chits. In 1983,

the city's income from water fees was 2.62 million yuan, an increase of 1.54 million yuan over the previous year, and the utilization rate for the canal system's water increased, generally, about 10 percent. They also maintained the grasp of the two civilizations--material and spiritual--at once, combining the construction of water conservancy projects, the construction of production bases, and the construction of rural townships, with the construction of scenic tourist spots, going all out in planting trees and creating forests, beautifying the environment, and so making water conservancy projects material foundations that both build benefits, eliminate harm and develop production, but are also places for the spread of spiritual civilization. There are already more than 20,000 projects in the city that have formulated regulations for environmental beautification; 6,696 mu of trees have been planted, 6,937 kilometers of canals have been greenified, 320 flower beds and places to view and admire fish ponds have been opened, and a large number of water conservancy projects have appeared with such special features as gardens beginning to take shape.

Man realizes that there is no limit to nature transforming nature. Centered on the demands of quadrupling total industrial and agricultural output value, the masses and cadres of Yantai City have continually marched broadly and deeply in pursuit of water control. By taking improvement of economic results as the main priority, they are getting a firm grasp on four things: strengthening and consolidating the foundation of current water conservancy, while at the same time constructing new projects; going all out in conserving water and using it scientifically, while at the same time actively developing new water resources; energetically developing water and soil protection, while at the same time doing a good job with water conservancy; and energetically developing the joint construction of the two civilizations for reservoir and village, while project management units are doing a good job themselves with civilization construction. The people are determined to use their new accomplishments to promote the development of rural commodity production, so the construction of the Jiaodong Peninsula will be even more beautiful and richly endowed.

VI. A Facelift for an Ancient Irrigation District--Water Conservancy Construction for the Ningxia Irrigation District

The Ningxia irrigation district, with its history of more than 2,000 years, is one of the oldest large-scale irrigation districts now in the motherland. Developed over the centuries, long ago it was already a rich and populous region on the upper and middle reaches of the Huang He. But because of limitations imposed by social conditions and technical levels, for a long time facilities were simple and crude, and flood and drought disasters occurred often because of changes in the water's level between very high and almost dry. Before Liberation, the projects were in disrepair, the irrigated area had shrunk, and the masses were extremely poor.

Ningxia was liberated in September 1949, and under the leadership of the CPC, the people built water conservancy projects in a big way, transforming the irrigation district. By renovating and expanding old canals and ditches, and by building new canals and ditches, they controlled river and mountain floods, set up a comprehensive drainage system, expanded the capacity of the irrigation canals to convey water and quickly expanded the irrigated area. After the construction of the key Qingtongxia water conservancy project, they raised the rate of assurance for irrigation and created even more conditions for the further development of the irrigation district. With the great development of farm capital construction and of auxiliary facilities for farmland water conservancy, plus the constant reform of the administrative system, the irrigation district has achieved guarantees against drought and waterlogging and a stable, high yield. The irrigation district is only one-third the total cultivated area of the autonomous region, but its grain yield is over two-thirds of the autonomous region's total, and there has been comprehensive development of forestry, animal husbandry, sideline occupations and fishery.

The area of the Ningxia irrigation district is about 10,000 square kilometers, divided into two large sections by Qingtong Gorge. Above it is the Weining Plain, and below are the Yin Quan and Wuzhong plains. The irrigation district has 11 counties (and cities) and 20 state farms and forests. Since the establishment of the People's Republic, the water conservancy construction of the district has used about 200 million cubic meters of stone and earth and invested 660 million yuan (including 270 million yuan for the key Qingtong Gorge project). The area of the irrigation district has increased from 1.92 million mu right after Liberation to the present 4.12 million mu. The irrigation capacity has been strengthened and grain yield has grown more than five-fold.

The primary methods for water conservancy construction in the irrigation district are:

1. The renovation and expansion of old canals, the digging of new canals and the expansion of irrigated areas: Adopting the method of "cutting up river bends and making things smooth," they renovated and expanded dry, old canals, such as the Qin, Han, Tanglai, Hanyan, Huinong, Qixing and Meili, one after the other, raising both the degree of safety of the canals and their capacity to convey water. At the same time, they opened up the first and second state

farm canals from the point of bifurcation of the Qin Canal and the Tanglai Canal, the Beigan Canal which splits off from the Meili Canal, the Gaozhi Canal which splits off from the Qixing Canal, the Zhongning Yuejin Canal from the Huang He diversion canal, and the Xigan and Donggan canals of the Qingtongxia irrigation district, for a total of 425 kilometers. And in areas outside the old irrigation district that are unable to have irrigation using the natural flow of water, they constructed 405 large and small pump stations to lift the water, at Tongxin, Zhongwei Nanshantaizi, Qingtongxia Gancheng, Wuzhong Biantangou, etc, with a capacity of 1.66 million kilowatts. They expanded the irrigated area by more than one million mu. For example, the Tanglai Canal, which is the largest, increased canal mouth intake capacity after renovation from 60 cubic meters per second to 150 cubic meters per second, thus creating the conditions for an expansion of the irrigation district on the middle and lower reaches. Because the canal was shortened, the grade increased and the flow smoothed out, they can avoid clearing out silt once or twice a year on the main canal. With the expansion and renovation of the old main canal, the capacity for diverting and conveying has been increased, they have merged some scattered intake mouths, and thus greatly reduced the wages needed for annual repair of the canals.

2. Establishment of a drainage system to drain excess lake water, reduce the calamity of inundation and improve the farmland drainage situation: Altogether, they built 32 free-flowing main drainage ditches with a total length of 789 kilometers, plus a lot of branch ditches, lateral canals and farm ditches and have already completed a fairly complete free flowing drainage system. They also built 148 electrically powered drainage stations, with an installed capacity of 6,855 kilowatts, and over 5,000 shallow motor-powered wells, making the so-called 72 connected lakes of the old irrigated district into a rich, fertile farmland criss-crossed by canals and ditches and connected by intersecting foot paths. State farms like Chao Hu, Xi Hu, Balang Hu and Guanma Hu are named after lakes, built on former spill water lakes. Since the 1960s, most of the irrigation district has been in a process of ridding itself of salt, and the lowering of the groundwater level has accompanied effective drainage, which has, in turn, gradually reduced the salinity of the soil. Planting paddy rice on filled-in silt has been an effective measure for improving low lying saline-alkali soil in this irrigation area, "saline soil has become effective, opening up ditches and planting paddy rice." Rotating paddy rice with dry crops is an excellent cultivation tradition. Irrigation by diverting the Huang He brings the advantages of the water and the benefits of the silt, and converts the harm of Huang He silt into an advantage. According to survey statistics, each year 20 million tons of silt from the Huang He are deposited in the existing irrigation district. All contain organic fertilizer. The current rather complete drainage facilities of the irrigation district have become a dependable basis for the consolidation and development of the irrigation district.

3. Preventing river and mountain floods: Some 397 kilometers of the Huang He are within Ningxia's borders, and of this, 318 kilometers are within the irrigation district, and because the river course wanders, washes out, floods over in a big flood and collapses banks in a little flood, damage to farm villages and communication on both banks still occurs at times. The path and

washout position of the Huang He's main stream changes with the differences in large, medium-sized and small flows. When one bend forms, then several others appear as well. Building bank revetment docks, bridging over spur dikes, and using concrete tetrahedrons to prevent washing out and bank collapse can all help temporarily. Since their success in artificially smoothing out the sharp Dongsheng bend of the Huang He (in Yongning County) in May 1980, they have been successful using the method of river-smoothing embankments to prevent floods from flooding farmland on both banks. At the same time, in line with the floods' characteristic of being very fierce but without large amounts of water, they are guiding scattered floodwater into low-lying land that can detain and store it, thus forming a flood detention area, reducing the flood's peak and changing a fierce flood into a slender stream, and effectively reducing or even eliminating mountain flood disasters. With the perfection and improvement of project facilities and the gradual realization of soil and water protection, they have applied methods of guiding, storing and detaining, and the effectiveness of mountain flood prevention and control has become even more apparent.

4. Construction of the key Qingtong Gorge project for the Huang He has raised the rate of assurance against canal floods and has created very advantageous conditions for the development of the irrigation district. This is a key large-scale water conservancy project that takes irrigation as the main thing and combines the overall utilization of power generation, flood prevention, and ice run prevention. Its construction brought to an end the history of the Qingtong Gorge irrigation district's main east and west canals diverting water without dikes, markedly heightening the canals' effectiveness against floods, and creating the prerequisites for the construction of canals in high places. The construction of the main east and west canals was made possible only after the key project raised the water level and controlled the amount of water, at the same time removing the threat to the canal head of large flows and ice runs on the Huang He and saving a tremendous amount in the consumption of human and material forces for the annual repair of the canal head. The large dike raised the water level 20 meters. The installed capacity of the project is 270,000 kilowatts, and it generates one billion kilowatt-hours of electricity annually, which is one-half the installed capacity of Ningxia's electric power network. Much of the electric power generated after the unit went on-line has promoted agricultural production, increased state financial revenue, and benefited the nation and the people. The project has been praised as "the pearl on the frontier."

5. Development of large-scale farm capital construction: In line with the unified distribution of canals, ditches, fields, forests, villages and roads and their comprehensive management, they have done a good job with farmland water conservancy and its auxiliary components, allowing the old scattered irrigation district to achieve initial changes toward "garden style" and mechanized cultivation, which has not only improved conditions for irrigation and drainage, but also aided the improvement of farming and of saline-alkali soil and expanded cultivated land by about 15 percent. Orchards and strip fields are on a grand scale, and when viewed from up high, they are magnificent sight, like a chessboard.

6. Saline-alkali conditions have been brought under control: The irrigation district is arid, with little rain and intense evaporation, a high groundwater level, long endangered by saline-alkalinity. The primary method for bringing saline-alkalinity under control can be summarized by irrigation, drainage, cleansing and silt, and in coordination with agricultural measures, they have been effective. The rational utilization of the Huang He's water and silt, strengthened drainage facilities, strict control of the groundwater level, and, particularly, growing paddy rice in low-lying areas, conveying drainage water and bringing saline-alkalinity under control, have all brought very rapid results.

The Yinbei area of the irrigation district is not suited to free-flowing drainage because of its gentle terrain plus surface saturation when the Huang He has broad flows, and so they have applied electrically powered forced drainage by small generating stations on short ditches, along with motored-powered wells that combine irrigation and drainage. These have the effect of lowering and controlling the groundwater level. Observation data over many years prove that the boundary for groundwater between storing or casting off salinity is 1.7-1.9 meters below ground level prior to irrigation. The demands of crop growth on groundwater are not a case of the deeper the better. And the demands on groundwater level of various crops in their various stages of growth are not uniform. The appropriate depth for adjusting and controlling the groundwater level involves many factors such as irrigation water, drainage water, precipitation, evaporation and climatic change, and should become a major theme of continuing research from now on.

7. Reform of the management system and improved management work: First, they gradually promoted the planned use of water on main and branch canals and corrected the old habits of broad irrigation and irrigation in the daytime but not at night. Then they set up specialized management organs in line with the canal system and comprehensively promoted the planned use of water, and irrigation efficiency increased over the years. In recent years, they also tried the planned supply of water, changing by the amount of water used. The peasants' notion of valuing water highly has generally grown stronger and instances of water leakage and the discarding of water have dwindled considerably. They have ameliorated the contradictions between the upper and lower reaches and the sense of responsibility of managers has generally become stronger.

Through over 30 years of construction and transformation, today's irrigation district has already become the "Jiangnan of the frontier" in reality as well as in name. Canals and ditches criss-cross the area, suitable for wheat and paddy rice, without drought or waterlogging, and with stable, high yields, and it has become one of the nation's 12 commodity grain bases. Total grain yield right after Liberation was 320 million jin; in 1983, it surpassed 2.25 billion jin. Particularly since the 3d Plenum of the 11th CPC Central Committee, the party Central Committee's correct policies have greatly promoted production in the irrigation district, and the average annual grain increase has been nearly 200 million jin for 4 successive years. The irrigation district's contribution to the nation will grow steadily.

VII. Recent Developments in Seepage Prevention Technology for China's Canals

After the establishment of new China, technology for preventing canal seepage developed very rapidly. Since the 3d Plenum of the 11th CPC Central Committee, the nation's 26 provinces, autonomous regions, and municipalities began cooperatively to study and attack the main problems and have achieved many advances. These advances guided and promoted production and achieved clear results. For example, Xinjiang applied various effective measures in lining 30,000 kilometers of canals, and in the last 3 years, they have lined an average of 1,000 kilometers per year with plastic film; Shaanxi spread over 3,000 kilometers of concrete "U"-shaped canals. The rate of progress in canal seepage prevention has been very rapid, project quality has risen, they have conserved water, and the results have been striking.

A. Seepage Prevention Materials

The study of seepage prevention materials is carried out in line with the principles of using local materials and suiting measures to local conditions, both satisfying project requirements and maintaining a low price.

1. Mortar: the materials can be procured locally, the price is low, many places have used it for a long time, and they have abundant practical experience. However, the problem is that its ability to resist freezing is not up to standards, and it is used mostly in small or medium-sized projects in warm areas or in closed canals or closed pipes. To expand the supply of materials, Guangdong used a special shell mortar made by burning shells from the Binhai and used shell mortar and sandy soil for canal seepage prevention, with excellent results. To reduce cracking when the material dries and shrinks and to raise the early phase strength, Hunan, Guizhou and Sichuan have separately blended sand, gravel, coal dregs, and so on into mortar, and created three-part amalgam (or four-part amalgam), and they have had very good results when they using it for canal seepage prevention. For example, after all of the main canals in Hunan's Shaoshan irrigation district were lined with the three-part amalgam, losses from leakage dropped by 86 percent and the coarseness coefficient of the canal bed also fell from the former 0.025 to 0.0198. Calculating from this, just the sections of the main canals using three-part amalgam can save 3.48 million cubic meters of water annually, and expand the irrigated area by 8,700 mu. According to the experience of Hunan, when the grade is appropriate and there is guaranteed quality construction, three-part amalgam lining can be used for 20 years without deteriorating, and its average life is 8 years.

Recently there have also been developments in the study of the hardening mechanism of mortar. Studies by the Sichuan Water Conservancy and Electric Power Research Institute find that apart from ion exchange and carbonization, the hydration effect plays a leading role in mortar strength. Moreover, they have proven that under humid conditions, it takes 30 seconds for a chemical combination to occur between stone mortar and earth, that the new gelated material, hydrated calcium silicate, has already appeared, and the longer the duration, the stronger these materials become. With high pressure and high-temperature curing, the strength increases even faster. Thus there are definite advantages to using mortar for underground and underwater projects.

2. Cement: Cement was used on a trial basis to protect the slopes of earthen dams and for canal and reservoir seepage prevention in the 1960s. There have been some developments in recent years in improving cement's freeze resistance and crack prevention. According to the experience of Shandong and Beijing, in choosing materials, they stress the selection of earth with a clay content of 3 to 10 percent and a sand content of 70 percent, a dry unit weight of 1.8 grams or more per cubic millimeter, and suited to increasing the amount of cement blended in, steam curing, blending in molasses additives and using hydrated glass solutions to soak, etc. But the freeze-resistance grade of cement is still only about 25, and so caution should be taken when using it in projects that require a high degree of freeze-resistance.

In the area of crack prevention, they found that when doing cement construction, they must strictly control the water content, strengthen early phase curing, put down a mortar or emulsified asphalt layer on the surface, make expansion joints at distances of 1.5 to 2.0 meters, and so on. The results and methods of this research created the conditions for spreading the use of cement in canal seepage prevention projects and for using it more effectively. To spread these results as quickly as possible, Shandong, Hunan and other places have manufactured machines for making cement pipes and machines for making cement slabs, etc. To conserve cement and lower costs, they have raised the amount of cement mixed into the surface layer of lining in their construction of cement canal liners, and reduced the amount of cement mixed into the lower layer, with excellent results.

3. Stone: In areas with plentiful stone supplies, stone seepage prevention is relatively low-cost, and fairly effective in preventing seepage and washouts. To raise the beneficial results of seepage prevention, some southern provinces and autonomous regions have laid mortar, clay, three-part amalgam or plastic film under the stones, or have employed the method of pouring loess paste (or mortar paste), and can reduce losses from leakage by over 60 percent. For example, Hunan's Baima irrigation district lined canal bottoms with three-part amalgam and reduced loss from leakage by 63.3-71.4 percent, and thereupon conserved water, raised the efficiency coefficient for the canal system's water from 0.3 to 0.6, and not only allowed the irrigated area to reach the planned area (180,000 mu), but also expanded it by 40,000 mu, so that the area that is actually irrigated reached 220,000 mu.

4. Concrete: In recent years, areas that are short of standard sand and stone materials have studied using fine sand, shale, mudstone and other local sand and stone materials to combine in the manufacture of concrete and have had rather good results. Based on the recommendation of data from the Northwest Water Conservancy Research Institute, using fine sand with a coefficient of fineness of 0.385 produces concrete with a strength grade between 140-329 kilograms per square centimeter and a seepage resistance grade between 2-7 kilograms, and they have already used it with good results in canal lining projects in the Shayuan area of Shaanxi's Dali County, and the per-cubic-meter cost fell to 8.92 yuan. According to research data from Sichuan's Water Conservancy and Power Generation Research Institute, using fresh crushed shale and mudstone to manufacture concrete with a strength grade of 199-238 kilograms per square centimeter, a freeze-resistance grade of 25 and a seepage resistance grade of 2 kilograms can save about one-half the

investment when used for canal seepage prevention projects. In addition, Ningxia's Water Conservancy Research Institute found that when 2 percent converted or unconverted powdered sugar additive was added to concrete, it could raise its strength by 35.2 percent; the cement used by the Northwest Water Conservancy Research Institute which was cured by vinyl chloride and light oil solvent or unrefined benzene solvent had good results, low cost (0.31-0.54 yuan per square meter) and, moreover, solved the problems associated with steep slope sides in concrete canals, the labor needed to sprinkle water for curing, and the lack of good results.

5. There has been fairly rapid development in the study of new materials: Among them, plastic film has already been broadly applied in Xinjiang, Hebei, Shanxi and other provinces and autonomous regions, because it is fairly effective in seepage prevention, construction is simple and the cost is relatively low. To spread the more scientific use of this material, Xinjiang's production and construction corps has already preliminarily put forth "Detailed Rules and Regulations for Planning and Constructing Plastic Film Canal Seepage Prevention," and has asked people to select black polyvinyl film that is 0.18-0.2 millimeters thick, and though rigid materials are better as the protective layer for plastic film, if soil is used, they say that the slope coefficient should be between 1.75-2.75, and at the same time, grass should be eliminated before the film is laid down. As for the question of how many years it can be used, according to the explanation of the Water Conservancy and Hydroelectric Research Institute's Northeast Wang State Farm's experimental project, plastic film has already been used for 18 years, the rate of elongation drops little, aging is minimal and, estimating from the rate of change of the elongation for 2 and 18 years' use, its length of use is 20 to 30 years or more.

Through 6 years of use, asphalt and concrete seepage prevention has shown that when used in canals where temperatures are between -26 degrees and +41 degrees Centigrade, changes from frost heaving are between 70 and 94 millimeters, and with a discharge of 2.5 to 26 cubic meters per second, its ability to resist seepage and cracking at low temperatures is good. It also has the advantages of a domestic source of materials and a fairly low cost. A sample examination by the Gansu Water Conservancy Research Institute of the asphalt and concrete canal seepage prevention projects built in the early 1950s shows that their aging was not severe and the period of use should be over 30 years, and hence, they are suited to popular application in canal seepage prevention projects in areas with freeze damage.

The building technology for canal seepage prevention through asphalt and fiberglass asphalt felt is basically the same as that for plastic film. Both laboratory and field research data from the Northwest and Qinghai Water Conservancy Institutes show that this kind of material is stronger than plastic film (its tensile strength at -16 degrees Centigrade is 46.6 kilograms per square centimeter), withstands aging and is better able to meet unfavorable factors in construction, and so now its use is spreading rapidly in canal and reservoir seepage prevention work in Qinghai, Gansu, Nei Monggol, and Jilin.

In the area of water-proof material for the expansion seams between concrete slabs lining canals, polychloride and clay daub is quite good but its cost is rather high. Shaanxi's Water Conservancy Institute has suggested tar and plastic daub as a waterproofing material. This material's low-temperature plasticity and its ability to adhere to concrete slabs is comparable to that of polychloride daub, but its cost is 29-59 percent lower, and it is already being widely used.

Canals built with the present method of sprinkling concrete often crack due to freeze damage, and they are difficult to repair. Consequently the Northwest Water Conservancy Institute has proposed both patch and seal methods to handle them. Laboratory tests and 4 years of field tests using these methods show they are feasible.

B. Structural Shapes for Canal Linings

Recent research into the structural shape of canal linings has been mainly in seeking out forms good at resisting freeze damage. Present research proposals and verification from actual experience shows that the best shapes are:

1. "U-shaped" canals: Compared to trapezoidal-shaped canals, they have the advantages of taking up less land, having faster flows, better freeze-resistance and lower costs, and they are a better sectional structure form for concrete lined canals. They are already popular in small and medium-sized canals that are above -25 degrees Centigrade and rather deep groundwater. The Northwest Water Conservancy Institute carried out 3 years of on-the-spot observation of a large U-shaped canal in Shaanxi's Fengjiashan irrigation district with a discharge of 58 cubic meters per second and the canal was stable when the actual greatest freeze heave was 1.93 kilograms per square centimeter. At first glance, the large U-shaped canal is a success in central Shaanxi. To meet the situation in the spread of U-shaped canals for different kinds of ground, various places have made semi-circular or curved canal bottoms and trapezoidal side slopes or retaining wall side slopes similar to a U-shape. The question of whether or not areas with severe freeze damage and fairly shallow groundwater can use U-shaped sectional canals awaits further research. Yet the Shimen paddy rice irrigation district of Shaanxi's Hanzhong Prefecture has already successfully used U-shaped canals. In planning U-shaped canals, concrete canals below the branch and lateral canal level can have an erect height of 0.7 to 1.0 times the circular diameter, and middle-sized canals can be at one-half the circular diameter, and the freeze resistance is even better if reinforced beams are added at the same time.

2. The types of trapezoidal freeze-prevention structural shapes for canal developed in recent years are given below:

a. Canals formed by prefabricated concrete slabs and beams on stilts: Tests by the Qinghai Water Conservancy Institute show that an elevated canal with prefabricated beams of 0.1 x 0.1 x 2.0 cubic meters and prefabricated slabs of 1.0 x 1.0 x 0.06 cubic meters have fairly good freeze resistance and are fairly stable. Qinghai used them in a 1978 experimental project in Yunguchuan Reservoir's Haigan canal, and up to the present they are still in

basically good condition. But the construction is fairly complex and requires a rather large investment.

b. Construction with hollow-core slabs: Because they have a hollow core, this shape has the advantages of warding off cold, resisting freezing, reducing volume and reducing costs. At present they are being used in Xinjiang, and Hebei has begun testing them.

c. Canals lined with a double layer of sealed plastic film, with a prefabricated concrete slab on top: The advantage of this style is that it uses a double layer of plastic film, deep and shallow (with soil in between) and at the same time cuts off water from canal seepage, groundwater supply and atmospheric precipitation, making the humidity in the canal's foundation lower than the amount of water that would begin freeze heaving, thus reducing or preventing freeze damage. Xinjiang, Gansu and other areas are now testing this and summarizing their experiences.

C. Research on Canal Seepage Prevention and Lining Freeze Resistance

Freeze heaving causes very severe damage to canal seepage prevention linings. In recent years, water conservancy institutes in the northwest, northeast, Gansu, Qinghai, Xinjiang, Liaoning, and Shanxi have done a great deal of research into the three areas of the freeze damage mechanism, types of freeze damage, and measures to resist freezing in canal seepage prevention and have made a great deal of progress.

1. Study of the Freeze Damage Mechanism in Canal Seepage Prevention Linings.

a. In large trapazoidal loess canals where the freeze-line is 0.8 to 1.0 meters and where the groundwater is fairly deep, freeze heaving is concentrated within the upper 40 centimeters where about 90 percent of the freeze heaving occurs. The thickness of the obvious "primary freeze heave layer" is 57 percent of the frozen earth layer. When the groundwater is shallow, heaving occurs in the whole frozen earth layer, and the closer to the groundwater, the greater the heaving because of the moisture supply, and so the "primary freeze heave layer" is not sufficiently obvious. After all, the distance of the groundwater from the frozen surface can produce the moisture supply effect, and because this changes with different types of soil, the height is generally comparable to that of the soil's capillary rise. According to field observations in Gansu, its distance with sandy loam or loam is about 1 to 1.5 meters.

b. The determining factors in the amount of freeze heave are the amount of moisture moving into the frozen earth in the process of freezing, and the texture of the earth, speed of freezing, the natural water content and the water source of the moisture supply. Generally, sand grains (larger than 0.05 millimeters) produce little or no moisture movement, fine clay grains (0.05 to 0.005 millimeters) and clay grains (smaller than 0.005 millimeters) have very strong moisture movement. When fine clay is greater than 12 percent of the sand and gravel, moisture movement is possible. According to a Liaoning survey, when the groundwater is 80 centimeters deep, the amount of freeze heaving is different for different soils because their moisture movement is

different. Freeze heaving is 116 centimeters for heavy soil, 94 centimeters for light soil, 25 centimeters for fine sand and 15.7 centimeters for coarse sand. Secondly, when sudden cold rapidly shifts the frozen surface lower, and the moisture cannot keep up with the shift, freeze heaving is not marked; and on the contrary, when the cold is not severe and the frozen surface shifts lower slowly and the moisture has ample time to move in, then freeze heave is striking. When the natural humidity is lower than the amount of moisture needed to start freeze heaving, it cannot occur, and when rain, snow and canal water seepage is higher than the soil's humidity, then it does occur. And when ground water can supplement, the freeze heaving can be even more severe.

c. Canals run in different directions, and because the time that canal slopes and bottoms receive the sun's rays and radiated heat is different, added to the fact that they are affected by different wind speed and radiated heat conditions, the distribution of temperatures on the canals' sections is imbalanced, freeze heaving varies, and so the amount of freeze heaving is different. According to Gansu data, when canals run east and west, the ratio for closed and open canal slope freeze depth is 1:0.53; when canals run on a line 18 degrees northeast, the ratio is 1:0.77; and when canals run north and south, there is not a great difference from the east-west canal slope freeze depth. Data from the Liaoning Water Conservancy Institute show that freeze heaving for various positions of the canal cross-section generally develops from the top of the slope then down toward the bottom, that heaving is greatest at the top of a closed slope and smallest at the middle and bottom of an open canal slope.

d. When the groundwater is 70 to 90 centimeters below the bottom of trapazoidal canals running east-west, the freeze heave strength vertical to concrete slabs is greatest at the bottom of the canal, followed by the slopes of closed canals, and is quite slight for the slopes of open canals. The freeze heave strength of the lower part of the slopes is greater than for the upper part and is distributed identically with the amount of freeze heave.

e. In areas where the groundwater is fairly shallow, an important feature of freeze heave at the base of canals is that it follows the imbalance of the cross-sectional distribution. For the most part, the heaving is greatest on the canal's bottom, smaller on its slopes, and least at the tops of the slopes. Consequently, in the process of freezing, the canal's bottom section lifts, but its top or slopes change only a little or not at all, and so the linear distance of the canal slopes' frozen section must shrink.

f. The cracks that develop due to freeze heaving in canals lined with concrete and stone all run lengthwise (following the direction of the flow). With severe open-type freeze heaving, most of the cracks on the side slopes of canals are in the middle and lower sections (about one-quarter to one-third of the way up from the bottom of the slope), and those in the bottom slabs are in the center; with closed-type freeze heaving, most cracks in closed canal slopes are in the center or lower section. There are very few cracks in the sides of closed canals, and if there are cracks, they are in the middle or lower sections. If cracks develop in the bottom slabs, most of them are at the bottom of the slopes.

g. Data from current surveys show that the normal heave strength of concrete trapezoidal canal lining is 1.55 kilograms per square centimeter and that the greatest normal heave strength for concrete U-shaped canals is 1.93 kilograms per square centimeter.

2. Types and Categories of Freeze Heave Damage to Canal Seepage Prevention Linings

Four types of freeze heave ruptures have been suggested by current research: 1) denudation; 2) cracks arising from freeze heaving; 3) step-type ruptures arising from freeze heaving; and 4) landslide-types ruptures arising from freeze heaving.

The Liaoning Water Conservancy Institute divides the extent of freeze heave damage into four grades: no freeze heave damage, slight freeze heave damage, freeze heave damage, and severe freeze heave damage. The results of design plans for canal seepage prevention based on these grades have been quite good.

3. Measures To Prevent and Control Freeze Damage to Canal Seepage Prevention

Protecting the quality of lining construction is an important aspect of preventing and controlling freeze damage, and so in recent years the Northwest Water Conservancy Institute and concerned units in Shaanxi have manufactured some semi-mechanized construction tools which have played an important role in guaranteeing the quality of concrete construction. On this basis, and in line with the freeze damage mechanisms and influential factors that have already been clarified through research, they have purposefully adopted the following measures to prevent and control freeze damage, with rather good results.

a. Lowering soil moisture at the canal's foundation, and preventing the movement of moisture during the freezing process: This requires that, whenever possible, we build square and covered canals, drain moisture that is below and at the top of the canal slope, do a good job with working joints and expansion joints, and prevent moisture from seeping into the canal's foundation. According to the experience of Xinjiang and Gansu, planting trees on the banks of the canals and using biological drainage methods to lower soil moisture at the canal's foundation has brought very good results. Usually, one 3-year-old willow tree can draw 2.5 cubic meters of water annually, and in actual observation of the same canal, moisture content of soil behind concrete lining slabs in canal sections with trees planted on the sides was 14 to 19 percent, but the moisture content for canal sections without trees was 30 to 33 percent, and under the same negative temperature, the basic moisture content of canals with trees is low and there is only light freeze damage.

b. Use of rational lining composition and seepage prevention materials: To meet the changing forms of freeze heaving, use asphalt concrete lining or use a lining composition that combines two different types of materials such as asphalt and fiberglass cloth felt and plastic film with pre-fabricated concrete slabs. In areas with stone materials, they can use a stone composition with stone not less than 30 centimeters thick. For small-scale canals in areas where the groundwater is fairly deep, they can use concrete or

stone U-shaped canals. These forms are currently being popularized throughout China's north.

c. Lay cushion layers: Areas with abundant gravel can lay cushion layers. We have had the following new achievements in the area of cushion layer laying research:

(1) Because freeze heaving is imbalanced, the best cushion layer construction for the side slopes of trapezoidal canals is a triangular shape that is thinner at the top and thicker at the bottom.

(2) Where groundwater is very deep and soil drainage is fairly good, the thickness of the cushion layer can be one-half to one-third of the freeze depth.

(3) When the groundwater is fairly deep and the soil is a double layer of clayish or heavy clay soil, the thickness of the cushion layer should be 75-90 percent of the freeze depth.

(4) Cushion layer results are not very good when the groundwater is fairly high.

(5) The amount of clay should usually not be more than 3 to 5 percent of the gravel cushion layer. But in Xinjiang's experience, no closed freeze heaving occurred when a cushion of aeolian sand with 5 to 6 percent fine clay was used; and open freeze heaving was 2.5 millimeters and the freeze heave rate was 0.74 percent. This question should be studied further.

D. Construction Techniques in Canal Seepage Prevention

To raise project quality, hasten the pace of construction, and close the gap in construction between China and foreign countries, in recent years the Northwest Water Conservancy Institute, the Baojixia, Fengjiashan and Jinghuiju management bureaus in Shaanxi, and the Hunan Water Conservancy Institute designed, built, and popularized several construction machines.

1. A vibrator-pounder for lining the slopes of trapezoidal canals with concrete: This machine casts a width of 2 to 3 meters at a speed of 0.6 to 1.0 meter per minute, and each machine costs about 600 yuan. It has already been used in canal lining work in China's foreign aid construction work in Tunisia.

2. D80, D60, and D40 concrete U-shaped canal lining machines: These machines are suited to small U-shaped canals with a discharge of less than one cubic meter per second. Their pulling force is not less than one ton and they can use both electric or diesel powered cable hoists. Each machine can cast five kinds of sections of different depth, and one machine has multiple uses. It forms a canal in one turn at a speed of about one meter per minute, which can raise work efficiency about 10-fold over human labor. The cost of each machine is 1,000 to 3,000 yuan. In recent years its use has spread rapidly, and it is manufactured and used the most in Shaanxi, Shanxi, and Beijing.

3. Orbital U-shaped concrete canal lining machines: This machine is suited to the casting of U-shaped canals with a discharge of 2.5 cubic meters per second, but cannot form a canal in one turn, and in each turn, casts a section 2 meters long, first casting the canal bottom and then the canal slopes, thus creating the form in two turns. It raises casting work efficiency 3-fold over human labor.

4. The model JUK-180 canal excavator: This machine is suited to excavating U-shaped canals with a discharge of 2.5 to 4.5 cubic meters per second. The measurements of the excavated section are: 97 centimeters in diameter, 167 centimeters in depth, 214 centimeters wide at the canal mouth, and with a sectional area of 2.7 square meters. The vertical section angle is 10.5 degrees. It can move forward at a speed of 12 to 15 meters per hour and excavate 28 to 36 cubic meters of soil.

5. The model RU-50 U-shaped canal excavator: This machine excavates a U-shaped canal with the following measurements: 25 centimeters in diameter, 50 centimeters in depth and 54 centimeters wide at the canal mouth. Its productivity is 21.96 to 48.8 cubic meters per hour, throwing soil a distance of 20 centimeters. The investment for excavating one cubic meter of soil is 0.5 yuan.

6. Concrete spraying construction: At present, this method is already being used in Shaanxi to spray cast large and medium-sized U-shaped canals with discharges of 12, 25 and 38 cubic meters per second. The quality is high, the speed fast and the results fairly good. But the one-time investment is quite high and so it can be used joint investment and utilization with other projects.

7. The model DLQ-100 cement block pressing machine: This machine is composed of four parts: a 1,000-jin head, a mold, a block pressing bed, and a chute. The measurements of the pre-fabricated cement blocks are 32 cm x 32 cm x 5 cm, and 40 cm x 32 cm x 4 cm. Production capacity is 30 to 40 blocks per hour. The dry unit weight of the pre-fabricated cement blocks is 1.85 to 1.90 grams per cubic centimeter. Each machine costs about 2,600 yuan.

VIII. Developing Sprinkler and Drip Irrigation Technology

Sprinkler and drip irrigation is one of the new technologies in farm irrigation. It was first popularized in the United States and some European countries starting in the 1940s, and in the past decade or two, it has been broadly applied. Sprinkler and drip irrigation technology has not been studied and applied in China for very long, but it has developed very rapidly.

China's overall water resources are not few, but both the regional distribution and seasonal distribution of precipitation are extremely imbalanced, and there are great changes from year to year, to the point that the north is vulnerable to spring droughts and the south to summer drought. Moreover, because there is much slope-side farming and the distribution of soil and water resources is uneven, traditional free-flowing irrigation methods alone do not completely meet irrigation requirements, so the study and popularization of new irrigation technologies saves water and is absolutely necessary.

China's experimental study and utilization work in sprinkler and drip irrigation began in the 1970s. By the end of 1977, sprinkler irrigation technology had become one of the nation's new key technologies to be popularized. In 1978, it was officially entered into the national farm water conservancy construction plans. From 1978 to 1982, the total national investment in sprinkler irrigation construction reached over 800 million yuan, and of this, 63 percent was supplemental aid from the state, and 37 percent was collected by communes and brigades. They developed 10 million mu of sprinkler irrigation, and of this, the provinces of Jiangsu, Henan, and Zhejiang each surpassed one million mu. They developed 200,000 mu of drip irrigation. The primary sprinkler irrigation (drip irrigation) crops are cotton, peanuts, tea leaves, sugar cane, vegetables, fruit and other cash crops, as well as wheat and other grains. We can see from actual experience in various areas that sprinkler and drip irrigation technology is very adaptable, and in particular, it adapts to various complex topographical conditions. For example, in areas with sloping land and sandy loam where surface irrigation is difficult, the use of sprinkler and drip irrigation is quite appropriate. Sprinkler and drip irrigation also save water (sprinkler irrigation saves about 30 percent over surface irrigation under general conditions, and saves about 50 percent over flood irrigation; drip irrigation saves even more water than sprinkler irrigation), it saves land, saves labor and increases yield (yields increase 10 to 45 percent), and the economic results are quite striking. Particularly with the sprinkler and drip irrigation of cash crops, vegetables and fruit, in 3-5 years at the most, or within one year at the least, the increased yield and harvest can recover the project investment. Consequently, sprinkler and drip irrigation technology has broad developmental prospects in China, and small-scale water conservancy with sprinkler irrigation is a good route for realizing water conservancy in mountainous areas.

China now has nearly 2 million horsepower in various sprinkler irrigation facilities, and about 90 percent is light, small-scale moveable sprinkler irrigation machine equipment; there are also some stationary and semi-stationary and large-scale unit sprinkler irrigation projects. The nation's

sprinkler irrigation facilities possess over 30 million meters of various kinds of irrigation pipes, which are mainly nylon (vinylon) plastic hose, plastic pipe, and partial thin-walled aluminum alloy pipes. The country already has nearly 100 small and medium-sized plants producing irrigation equipment, and of these, the sprinkler irrigation machinery plants of Zhejiang's Xinchang, Jiangsu's Jintan and Zhenjiang, Henan's Xinzheng, Shandong's Feicheng, and the Sprinkler Irrigation Company of Shanxi's Taiyuan all produce fairly large amounts; they have been designated as key sprinkler irrigation equipment production plants. Since 1980, the Xinchang and Jintan sprinkler irrigation machinery plants have also exported several thousand pieces of sprinkler irrigation machinery to the countries of Southeast Asia, earning several million yuan in foreign exchange.

The No 7 Plastics Plant of Shenyang and the No 1 Plastics Plant of Hebei's Shashi have now been designated to produce sprinkler irrigation equipment. Since 1976, Shenyang's No 7 Plastics Plant has supplied the nation with over 2,000 tons of plastic sprinkler irrigation equipment. This preliminarily satisfies the construction and production needs of the nation's sprinkler irrigation experimental units.

According to statistics, in recent years, the country is putting 8 to 10 million mu of irrigated land into use each year; this has played a very prominent role in combating drought, speeding water conservancy construction in mountainous areas, and developing a diversified rural economy. Jiangsu's Qidong County is one of the nation's key cotton producing counties, and to solve the cotton irrigation problem, this county, through self-sufficiency, bought 12,120 pieces of light, small-scale sprinkler irrigation machinery between 1978 and 1981, with a total investment of 11.43 million yuan. Of this, the financial administration at the provincial, prefectural and county levels helped with 135,000 yuan, and the masses themselves collected 11,295,000 yuan. The sprinkler irrigation area has already reached 850,000 mu, which is 80 percent of the county's total cultivated area, basically realizing full sprinkler irrigation for the entire county, and developing rapidly with obvious economic results. In recent years, Shandong has suffered from successive droughts, the groundwater level has dropped, water stored in reservoirs has declined sharply, agricultural production has been seriously threatened, and so sprinkler irrigation has become a welcome measure for resisting drought. By 1982, there were nearly 3 million mu of sprinkler irrigated land in the province, with close to 40,000 pieces of sprinkler equipment. According to our understanding, from 1978 to 1981, the province spent 100 million yuan on sprinkler irrigation construction (not including water source projects), of which the state supplied only 20 million yuan in support, and the remaining 80 million yuan was collected by communes and brigades. Generally, sprinkling sandy loam one to three times can increase the yield of peanuts and other cash crops by 10-30 percent.

Sprinkler irrigation for vegetables also plays an important role in alleviating the urban vegetable supply shortage and improving the production conditions for vegetable fields. Beginning in 1979 and for the following several years, Jiangsu drew special funds from local financial administrations to use in vegetable field sprinkler irrigation construction, and now they already have over 100,000 mu of stationary sprinkler irrigation, concentrated

primarily in the suburban areas of large and medium-sized cities such as Nanjing and Changzhou. A lot of cities in the north are giving serious attention to sprinkler irrigation for vegetable fields.

To adapt to the development of sprinkler irrigation, in recent years a lot of counties have established sprinkler irrigation companies and sprinkler irrigation service stations. These companies and service stations are all managed by economic methods, and all have profited. There are also a lot of counties where specialized sprinkler irrigation households have appeared, and their service is enthusiastic and thorough, their fees rational, the results of sprinkler irrigation good, economic results have increased, and they have been warmly welcomed by the masses.

Of the nation's 200,000 mu of drip irrigation, over 95 percent is drip irrigation for fruit trees. In Liaoning, there are 150,000 mu of drip irrigation land; in recent years, the province invested 21,486,800 yuan in drip irrigation construction, including water source projects, at an average per-mu investment of 135.17 yuan. According to survey analysis, the province's total investment in drip irrigation has already been recovered, and drip irrigation facilities are basically complete.

The accomplishments attained through the broad application of sprinkler and drip irrigation since 1978 are inseparable from the attention and support of leadership and concerned departments at various levels. It could be said that the spread and application of these two new technologies were set up on a foundation of the results of scientific experiments and research.

For 10 years, with the coordination and cooperative effort of concerned departments, experimental research on sprinkler and drip technology has achieved considerable results:

--They have appraised, finalized and are doing batch production of sprinkler and drip irrigation implements and equipment. Of these, the sprinkler implements with fairly good performance and which are widely used are: small, light sprinkler irrigation units used in combination with 4-, 5-, or 12-horsepower diesel motors; 14 types of standard pumps for use in sprinkler irrigation; 33 types of standard metal or plastic PY1 series single-mouthed rocker arm sprinkler heads; 6 types of standard movable piping systems made from thin-walled aluminum alloy or thin-walled polyethylene from a high pressure process; 4 types of standard water hydrants; and several types of standard, large (round and translational) and mid-sized sprinkler irrigation units have been appraised and put into trial, small-scale production. In the area of drip irrigation, those they have already made, appraised and finalized include drip heads, very small pipes, branch pipes, main pipes, joints, stoppage heads, three-way joints, elbows, filters and other equipment intrinsic to a drip irrigation system.

--They have constructed three sprinkler irrigation test sites in Zhejiang, Wuhan and Xinxiang, and successfully made automatic survey and measure metering equipment for these sites. Trials and research into the planning and design parameters for sprinkler and drip irrigation and the study of basic regulations for increasing yield and saving water through sprinkler and drip

irrigation for major crops, along with study of irrigation systems, have achieved preliminary stage results and provided a basis for the manufacture of various kinds of sprinkler and drip irrigation implements and equipment, for the planning and design of various types of sprinkler and drip irrigation systems and for the compilation of "Technical Standards for Sprinkler Irrigation Systems."

--They have already constructed sprinkler irrigation test sites for tea leaves, peanuts and other cash crops, and 1 movable drip irrigation test site of 1,000 mu for cash crops. The experimental constant sprinkler irrigation project about to be built in Henan's Jiaxian County will be able to sprinkle irrigate over 6,600 mu of tobacco, wheat and other crops. It will be China's first semi-permanent, constant sprinkler irrigation project.

--For 10 years, various places around the country have trained over 5,000 sprinkler and drip irrigation technicians; they have also set up a national information network for sprinkler irrigation technology and published a technical publication, "Sprinkler Irrigation Technology."

There are still some weak links in the development of China's sprinkler and drip irrigation technology, such as inappropriate construction, management that cannot keep on top of things, inferior quality and high prices for sprinkler irrigation implements and equipment, and so on. To hasten the quality improvement of China's sprinkler and drip irrigation implements and equipment, change the backward condition of manufacturing technology and the slow development of sprinkler and drip irrigation, it is absolutely necessary to introduce major manufacturing equipment and advanced technology. Toward this end, concerned departments are now strengthening work in this area.

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NATIONAL

BRIEFS

CHINA-SWEDEN DAIRY TRAINING CENTER--Beijing, October 30 (XINHUA)--An inauguration ceremony for a China-Sweden dairy training center was held here today. The center is was up jointly by the Chinese Ministry of Agriculture, Animal Husbandry and Fisheries, and the Swedish Agricultural Scientific and Technical University supported by the Swedish Technical Cooperative Commission. [Sentence as received] The center will train personnel specializing in the management of dairy farms and dairy plants, transportation, and distribution as well as laboratory technicians. It will also develop new dairy products. Located on the northern outskirts of the city, the center consists of a teaching building, a dairy farm and a processing factory, whose equipment has been provided by the Swedish side. It will enroll the first group of students by the end of this year. Huang Hua, vice chairman of the Standing Committee of China's National People's Congress, and Ingemund Bengtsson, visiting speaker of the Swedish parliament, cut the ribbon at the ceremony. Present on the occasion were He Kang, minister of agriculture, animal husbandry and fisheries, Chen Xitong, mayor of Beijing, as well as Lars Bergquist, Swedish ambassador to China. [Text] [Beijing XINHUA in English 1315 GMT 30 Oct 85 OW]

INCREASE IN FARM MACHINERY--Beijing, 6 Nov (XINHUA)--Over the past 6 years, the number of tractors in China has increased from 1.93 million to 4.15 million, according to today's ECONOMIC DAILY. In 1984, China's output value of farm machinery reached a record high of 10.5 billion yuan. Almost 7 billion yuan worth of it was sold through state companies, showing an increase of 1.2 billion yuan over the previous year. It is estimated that the Chinese peasants have invested 30 billion yuan to farm machinery over the past 5 years. The achievement is attributed to the rural reforms which raised the peasants' income. The growth in farm machinery is characterized by three features: the geographic nature of the different areas and the farmer's special need; the mechanization of planting and harvesting and for use in forestry, animal husbandry, sideline production and fishery; the implementation of diversified management in farm machinery allows farmers for the first time in history to buy machinery for their own use. [Text] [Beijing XINHUA in English 0812 GMT 6 Nov 85]

NATIONAL ORANGE OUTPUT REPORTED--This has been a bumper year for oranges throughout China; total output could reach 36 million dan, an increase of nearly 20 percent over last year. The output in Sichuan was 11 million dan, in Zhejiang 4.5 million dan, in Guangdong 3.5 million dan, in Jiangxi 2 million dan, in Fujian 1.9 million dan, and in Hubei 1.5 million dan. Due to natural disasters in Hunan, output could be lower than last year's level of 4.5 million dan. This year the price of oranges has been lower than that of last year. [Excerpt] [Beijing NONGMIN RIBAO in Chinese 22 Aug 85 p 2]

PLANT-BREEDING SYMPOSIUM CONCLUDES--More than 80 Chinese and foreign experts gathered in Beijing for a symposium on plant breeding by inducing mutation and other biotechniques. The techniques discussed are expected to increase China's crop yields by 5 to 10 percent. The symposium, which closed yesterday, was sponsored by the China Agriculture Society, Chinese Society of Nuclear Agricultural Sciences and Chinese Academy of Agricultural Sciences. Wang Linqing, secretary of the symposium said that nuclear radiation and biotechniques were now commonly used in selecting new strains of crops. She said that since the late 1960's, China had bred 194 new varieties of 19 plants and crops, expanding possible areas of cultivation to 8.6 million hectares last year from 4.6 million hectares in 1980. She said the new strains were expected to increase China's grain yield by 3-4 million tons a year and cotton by 400,000 tons. She said that the new plant breeding technology would be a major method for developing seed resources during the next 5-year plan. /Text/ [Beijing CHINA DAILY in English 21 Oct 85 p 3]

NEW RICE CULTIVATION TECHNIQUE--Nanjing, November 2 (XINHUA)--Chinese agronomists have developed a high-yield, asexual generating technique for rice cultivation, according to a recent appraisal meeting. The technique, developed by scientists at the Nanjing Agricultural College, can be applied in both south and north China, meeting sources said. Experts at the appraisal meeting held in Wuxi city, Jiangsu Province, reported that the new technique, which transplants tillers from rice stumps as seedlings, has yielded outputs 20 to 30 percent more than the conventional technique in Jiangsu and other provinces. Experiments in Huanggang County in Hubei Province showed an average output of about seven tons a hectare, equal to the combined output of double cropping cultivated with the conventional technique. Another advantage of the new technique is that hybrid rice does not degenerate for more than 20 generations. Using the traditional technique, a new generation had to be raised every year. [Text] [Beijing XINHUA in English 1036 GMT 2 Nov 85 OW]

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TRANSPROVINCIAL AFFAIRS

GANSU HOSTS STATE COUNCIL MEETING ON AGRICULTURE

HK180257 Lanzhou Gansu Provincial Service in Mandarin 1100 GMT 17 Oct 85

[Text] The State Council leadership group on agricultural construction in the Dingxi, Hexi, and [word indistinct] areas opened its fifth enlarged meeting in Dingxi on 17 October. Lin Hujia, leader of the group, presided and made a speech.

He pointed out: In the past 3 years, the leaders at all levels in Gansu and Ningxia have done their work well. Thanks to the common efforts of the cadres and masses, good achievements have been scored in agricultural construction in the Dingxi, Hexi, and [word indistinct] areas. The destruction of vegetation over large areas has been basically halted. A few places that were in difficulties have now been extricated from poverty. Most places have initially solved the problem of food and clothing. There has been an improvement in the poverty-stricken appearance of most places.

Lin Hujia demanded that the participants in the meeting take the spirit of the national conference of party delegates as their guideline, seriously sum up experiences, and study and make arrangements for the focal points in the next stage of work and the guiding principles for getting rich in light of local conditions. It is necessary to seriously study the question of economic results. Planting grass and trees must produce both economic and ecological results. Irrigation areas newly constructed in recent years must study measures for economical use of water and electricity. Apart from vigorously developing grain production, the areas must consider developing the raising of cattle, sheep, fish, ducks, geese, and so on, and make comprehensive use of water resources.

Li Ziqi, secretary of the Gansu Provincial CPC Committee, and (Cai Zhulin), member of the standing committee of the Ningxia Hui Autonomous Regional CPC Committee, also spoke at the meeting. Also present were leading comrades of state council departments concerned and of Gansu and Ningxia including Chen Guangyi, Wang Jianwen, Ge Shiyang, Lu Ming, and (Wu Shanxian).

CSO: 4007/51

TRANSPROVINCIAL AFFAIRS

STATE COUNCIL MEETING ON AGRICULTURE ENDS 24 OCT

HK291359 Lanzhou Gansu Provincial Service in Mandarin 1100 GMT 24 Oct 85

[Text] The fifth enlarged meeting held by the State Council leadership group on agricultural construction in Dingxi, Hexi, and Xihaigu regions concluded in Dingxi today.

The meeting pointed out: The general guiding principle of agricultural construction in Dingxi, Hexi, and Xihaigu regions in the future is still to emancipate the mind, to seek truth from facts, to foster strong points, to circumvent weak points, and to bring advantages into play. Proceeding from realities, we must ensure that places which are suitable for agricultural production must develop agriculture, places which are suitable for livestock production must develop animal husbandry, places which are suitable for timber production must develop forestry, and places which are suitable for industrial production must develop industry. Every place must find out and develop what can best be developed. The basic task is to lead the masses to get rich.

The meeting held: In the past 3 years, the Gansu Provincial and Ningxi Hui Autonomous Regional CPC Committees and Governments have seriously implemented all policies of the party. Thanks to the common efforts of cadres at all levels and the masses, progress in growing grass and trees has been made, good achievements in agricultural capital construction scored, the difficulties in providing drinking water for people and livestock alleviated, and certain achievements in energy in rural areas, migration of people, township and town enterprises, and development of intellectual resources scored. The cadres and the masses have felt that work has been done well.

The fifth enlarged meeting held by the State Council leadership group on agricultural construction in Dingxi, Hexi, and Xihaigu regions demanded: In current construction, taking the situation of uneven development into consideration, we must give guidance according to the different situation and must put forward a different target of construction.

1. In places which have been lifted out of poverty, it is necessary to lead peasants to get rich so as to catch up with the rest of the country.
2. In dry places which have food in a bumper harvest year and which cannot get through on a disaster year, the majority of them must find a way out by relying on building basic farmland, growing grass and trees, and developing diversification.
3. In places which are in serious difficulties, it is essential to be determined and to jump out of the circle of making a living locally. By means of migration, people are to be moved to places where conditions are better or labor forces are to be organized to go to other places to engage in sideline production. This is a new way to lift people out of poverty.

Prior to the conclusion of the meeting, Lin Hujia, head of the State Council leadership group on agricultural construction in Dingxi, Hexi, and Xihaigu; Liu Xigeng, adviser to the Ministry of Agriculture, Animal Husbandry, and Fishery; Ge Shiyang, vice chairman of the Gansu Provincial Advisory Committee; and Cai Zhulin, member of the Ningxia Hui Autonomous Prefectural CPC Committee, spoke.

/12640

CSO: 4007/69

TRANSPROVINCIAL AFFAIRS

BRIEFS

HUANG HE FOREST BELT--Zhengzhou, 1 Oct (XINHUA)--Over the past year, some 3.4 million youths in Shaanxi, Shanxi, Henan, and Shandong Provinces, Nei Monggol Autonomous Region, and Ningxia Hui Autonomous Region have taken part in tree-planting from Helan Shan to the coast of Bo Hai. In 1985 alone, 920,000 mu of land has been afforested, and 900,000 mu of farmland forest belts built, with a total of over 100 million trees planted. In the 7 years after completion of the afforestation project, a giant forest belt, measuring 3,000 kilometers in length and 10 kilometers in width, will be grown along the banks of the Huang He. [Summary] [Beijing XINHUA Domestic Service in Chinese 0026 GMT 1 Oct 85]

RAINY SEASON AFFORESTATION TASKS--Beijing, 13 Sep (XINHUA)--Incomplete data shows that as of early August, some 15 provinces, municipalities, and autonomous regions, including Yunnan, Guizhou, Sichuan, Shandong, Hebei, Liaoning, Gansu, Qinghai, Beijing, and Tianjin, have afforested 14.55 million mu during the rainy season. [Summary] [Beijing XINHUA Domestic Service in Chinese 0807 GMT 13 Sep 85]

CSO: 4007/51

ANHUI

CIRCULAR ON AUTUMN HARVESTING, SOWING

OW300644 Hefei Anhui Provincial Service in Mandarin 1100 GMT 26 Oct 85

[Text] The provincial People's Government issued a circular on 25 October calling on all localities in the province to take immediate action to overcome waterlogging and get the harvesting and sowing done quickly.

The circular said: Since the beginning of October, an unbroken spell of wet weather has prevailed in most localities in the province, with accumulated rainfall between 100 and 200 millimeters, and over 200 millimeters in some areas, causing serious waterlogging on low-lying land and affecting the ongoing autumn harvesting and sowing. Leaders at all levels and the masses of peasants must take immediate action to thoroughly accomplish the autumn harvesting and sowing in good time and with good quality.

The circular called on all localities to above all, step up guidance over the ongoing autumn harvesting and sowing work. Leaders at all levels must pay keen attention to damage done to agricultural production by the unbroken spell of wet weather by taking immediate action to organize cadres to go deep into the frontline of production to help the peasants solve problems in autumn harvesting and sowing. Departments concerned, as well as all trades and professions, must give top priority to agricultural production by providing such services as postal and telecommunications arrangements and supplying fine strains and fertilizers.

Second, it is necessary to rush in the harvest by immediately mobilizing the masses to clean the ditches to facilitate the flow of water and drain the waterlogged land. When the weather permits, it is necessary to get the harvest in quickly in order to minimize losses. At the same time, action must be taken to dry the harvested grain crops in good time so that they will not become mildewed.

Third, it is necessary to sow autumn crops as quickly as possible. The time is pressing for autumn sowing because the frost's descent [shuang jiang] is over and winter will begin shortly. All localities must take realistic measures to appropriately readjust the ratio between

semi-prostrate winter wheat and spring wheat, increase the quantity of seeds and amount of fertilizer applied, or plant the crops through shallow ploughing or no ploughing at all. If it is impossible to apply sufficient manure, additional fertilizer should be applied later. Keen attention must be paid to the seedling and cultivation of rapeseeds. It is necessary to do everything possible to overcome all difficulties and accomplish the autumn harvesting and sowing tasks around the beginning of winter.

Fourth, it is necessary to conduct field management in good time by organizing the masses to inspect seedlings, replant them if necessary, and apply sufficient fertilizer so that the seedlings can become sturdy. It is also necessary to clean mountain valleys in order to prevent the recurrence of waterlogging.

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CSO: 4007/69

ANHUI

BRIEFS

COTTON EXPORTS--This year was the first time Anhui exported cotton. As of the end of August, Anhui had signed contracts with foreign merchants to export more than 8,600 tons of cotton; at present 4,390 tons have been shipped. This batch of cotton will primarily be sold to Japan, Indonesia, Thailand, Federal Republic of Germany and other countries and regions. Foreign merchants are quite pleased with the quality of cotton in Anhui and hope to carry out a stabilized and long-term trade with us. Cotton companies in Xiaoxian, Dangshan, Sixian, Suxian, Lingbi, Mengcheng, Tianchang, Wuhe Counties and Anqing City all export cotton. [Text] [Hefei ANHUI RIBAC in Chinese 30 Sep 85 p 1]

CSO: 4007/55

BEIJING

CITY WORKS TO ENSURE WINTER VEGETABLE SUPPLY

OW021306 Beijing XINHUA in English 0837 GMT 2 Nov 85

[Text] Beijing, November 2 (XINHUA)--The annual cabbage buying spree has begun in the Chinese capital, as trucks loaded with vegetables are streaming into the city after dusk.

Fears for insufficient supplies this winter have been dispelled following the city government's promise last month to do everything it can to organize cabbage supplies from the suburbs and neighbouring provinces, according to officials at the city vegetable company.

Supply of stored cabbages is a matter of [word indistinct] importance in all northern cities in winter and next spring, the usual slack season for vegetable growing.

Each Beijing resident will get the same amount of top quality cabbages from government stores as last year--7.5 kilograms, at 0.035 yuan per half a kilo instead of 0.025 yuan as last year. Cabbages of inferior quality are not to be rationed.

Vegetable growing areas around the capital were reduced from 4,660 to 3,000 hectares following cabbage growing quotas were lifted at the beginning of this year. [Sentence as received]

The total output of cabbages will be 35,000 tons less, but the output of other vegetables will double to 50,000 tons, the company officials said.

Canteens of government institutions, factories and schools are encouraged to get their own supply directly from producing areas at lower prices.

The company said that the city has ordered 25,000 tons of cucumbers, tomatoes and green beans from Fujian, Yunnan and other southern China provinces to ensure the new year festival supply. These are rarities in winter in northern China.

According to reports from seven northern China cities, it is rather common that the low-priced vegetable growing areas have been reduced while high-priced ones have been increased drastically.

Owing to floods and typhoon, northeast China's Liaoning Province has difficulties getting sufficient vegetable supply this winter.

But in Xian, Tianjin, Shijiazhuang and other major cities, winter vegetables are growing well and may well meet their own needs. Tianjin has some to spare.

Railway authorities are now trying to marshal more trains to carry vegetables from the south to the north.

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CSO: 4020/63

BEIJING

BEIJING MAYOR URGES MORE MILK PRODUCTION

OW161409 Beijing XINHUA in English 1315 GMT 16 Oct 85

[Text] Beijing, October 16 (XINHUA)--More fresh milk will be made available to Beijing residents when several new milk processing facilities are completed in the next five years.

Work will start next year on a bottling factory with a daily handling capacity of 150,000 liters of milk. In addition, a new paper-carton packing line will package 100,000 liters a day.

Together with two other production lines, which have been completed recently at dairy factories, these facilities will almost double the present daily output of 280,000 liters. The new facilities are all expected to be in operation before 1990.

At present about 600,000 bottles of milk are reaching urban and near suburban households every day, more than twice the amount in 1979, according to Wang Dianlin, manager of the milk company.

To promote the sale of milk, the company plans to set up 48 all-day refrigerated milk service centers in city neighborhoods, plus 1,487 part time stations. In addition, the milk company will establish 40 new stores selling dairy products in busy shopping centers.

"The municipal government regards milk production as important second only to the vegetable supply," Mayor Chen Xitong said. "We can hardly do without milk. It is essential for the old and the young, for our athletes and patients, as well as for our guests," he said.

Beijing residents now find it easy to order a daily supply of milk, but troublesome to fetch the milk from the delivery stations. Queues are seen in front of some stations, with each person holding empty milk bottles to exchange for fresh milk.

"Service hours are too short. Every day after work I have to dash home to fetch milk for my baby before the station closes at six o'clock," said a young mother standing outside a delivery center in the western district.

An old lady responsible for the center explained: "milk spoils quickly, especially in the summer. It must be picked up as soon as possible."

Milk delivery stations in Beijing are usually open for two hours in the mornings and two hours in the afternoons. Some stay open until 20:00.

Only six percent of the households receive home milk delivery, due to the shortage of delivery people, the increased number of milk drinkers, and the difficulty in delivering milk in tall buildings, manager Wang said.

The price of milk in Beijing has been kept low for the past 36 years since the city's liberation in 1949. One bottle sells for 0.15 yuan, same as an ordinary soft drink. However, groceries or food stores are unwilling to sell milk because of the small profit and the lack of refrigeration to keep the milk fresh.

There are about 38,800 milk cows being raised around Beijing, producing about 375,000 liters of milk each day. About 50,000 liters of milk is used for processing milk powder and other dairy products, and 40,000 liters is used for making yogurt, another Beijing favorite.

Some farmers are turning away from milk production because of the large capital investment and the long waiting period for economic returns. To encourage farmers to raise more cows, the municipal government has agreed to provide low interest loans and other financial incentives.

Mayor Chen Xitong has encouraged the local scientists to find new types of feed for the cows and new dairy products that could result from processing milk.

CSO: 4000/36

BEIJING

REGULATIONS PROTECTING BEIJING FORESTS PROMULGATED

Beijing BEIJING RIBAO in Chinese 11 Aug 85 p 2

[Article: "Regulations for the Protection and Management of Rural Forestry Resources in Beijing Municipality"]

[Text] Article 1. General Principles

Section 1. In order to further protect, manage, and rationally utilize rural forestry resources, protect the legitimate rights and interests of forest owners, and speed up the greening of the capital, these regulations have been drafted, in accordance with the "Forestry Law of the People's Republic of China" and this municipality's concrete situation.

Section 2. "Forestry resources" as a term used in these regulations refers to forests, forest land, and wild animals and plants within such lands.

Section 3. All persons have a duty to plant trees, build forests and protect forests. All levels of the People's Government should promote the education of, organize, and mobilize the masses to show an interest in forestation and to protect forest resources.

Section 4. The primary agencies responsible for the work of protecting and managing the municipality's forest resources are the Beijing Municipal Forestry Bureau and the various district and county forestry (rural forest) bureaus.

Forestry assistants exclusively or non-exclusively designated by village and township people's governments shall assist the mayors of such villages and towns in managing their rural forest resources.

Section 5. Forest resource management shall be divided into different levels. The Municipal Forestry Bureau and district and country forestry (rural forest) bureaus shall survey their forest resources periodically as determined by national regulations and establish forest resource proposals.

Section 6. Identification of the scope of protected, utility, economic, fire-wood, and special-use forests shall be determined, based upon the particular circumstances, by the municipal or the district and country people's governments upon recommendations by forestry (rural forest) bureaus at the same level.

Section 7. A system of forestry funding shall be established pursuant to state regulations. Concrete details of such a system shall be determined by the municipal people's government.

Article II. Property and Use Rights for Forests and Forest Lands

Section 8. Property and use rights for all forests and forest lands under state or collective ownership, and for individually owned forests and individually used forest lands shall be registered, certified, and recognized by the local district or county people's government.

The legitimate rights and interests of owners and users of forests and forest lands shall be accorded the protection of law, and no unit or individual shall infringe upon them.

Section 9. For self-held mountains and shorelines under peasant management, real property ownership rights shall reside with the collective and forest ownership rights shall reside with the individual. Trees planted within the courtyards or sanctioned curtilage of a peasant's personal dwelling shall belong to the said individual. Individually owned forests and trees may be devised and transferred in accordance with law.

When collectives or individuals take assignment for wilderness mountain or shoreline lands suitable for reforestation from among those under state or collective ownership, trees planted after such assignment shall belong to the collective or individual taking such assignment. Where a contract provides otherwise, the provisions of such contract shall control. If one party to a contract wishes to transfer its assigned wilderness mountain or shoreline lands to another person's management, the other party to the contract must first agree.

Section 10. Where forests are planted by rail, highway, or water conservancy departments or organs, brigades, groups, or enterprise and business units, within the approved scope of their land use, ownership of said forests shall reside with the said department or unit. Forests planted by departments, units, and collectives, or jointly by individuals, shall be owned by the parties which participated in the planting, with benefits accruing as set forth in the contract.

Section 11. Disputes concerning property or use rights which arise between one individual and another, an individual and a collective, or between one collective and another entirely within one district or village shall be handled by the people's government of the district or village.

Disputes concerning property or use rights for forests or forest lands which implicate state-owned units, or which arise between different villages or townships shall be handled by the people's government of the district or county.

Disputes between districts and counties within the municipality shall be handled by the municipal people's government.

Section 12. Where a dispute arises concerning ownership or use rights of forests and forest lands, the disputants may apply to the people's government to decide the issue. Where the method of decision set forth by the people's government is not being followed, a disputant may, within 1 month of the date of receipt of notice of such decision, bring suit within the people's court.

Article III. Forest Resource Protection

Section 13. District, county, village, and township people's governments should supervise and urge such grassroots units, such as rural people's committees, collective economic organizations, state-run tree farms, rail, highway, and water conservancy units, to establish organizations, draft public pledges, organize the masses, set up responsibility zones, and deploy exclusive or non-exclusive workers, all for the protection of forests, and pay attention to preventing and putting out fires, along with other protection activities.

Section 14. Forest rangers designated by rural committees and grassroots units holding forests shall be honest and attentive to their appointed duties. They shall be appointed by district, county, village, or township people's governments and issued credentials and badges.

Under the leadership of the unit, the ranger shall take responsibility for making known the relevant laws, regulations, and forest-protection pledges. They shall patrol the forests, work to prevent fires, report tinder conditions, supervise cutting, and stop all destruction of forest resources and all activities in violation of forest fire ordinances. Where injury has resulted from destruction of forest resources, they shall report such immediately to the resident unit or local people's government for handling.

Section 15. Security organs and constabulary organizations should strengthen their work in protecting forest resources. As actual conditions require, security dispatch stations or deployments of specially deputized security personnel should be located in protected nature and scenic zones.

Security and procuratorial organs shall strictly enforce the law, and conscientiously investigate cases of destruction of forest resources.

Section 16. Forest lands within the municipality shall be divided into three grades of fire-prevention zones:

Grade one shall refer to protected nature and scenic zones and to contiguous tracts of coniferous forests exceeding 1,000 mu. Such zones shall have deployed a specified number of professional rangers, and shall be outfitted with firefighting and communications equipment, along with forest-protection and fire-prevention installations, posters promoting forest protection and signs concerning fire prevention.

Grade two shall refer to contiguous tracts of forested lands, other than those in zone one. Such zones shall have deployed professional or semiprofessional rangers, and be outfitted with forest-protection and fire-prevention signs. Grassy hills shall be managed and protected as grade-two zones.

Grade-three fire-protection zones refer to mountains suitable for reforestation, which should be the responsibility of a designated individual.

No unit or individual shall upon their own authority remove or destroy any forest-protection or fire-prevention sign, or violate any fire ordinance of a fire-prevention zone.

Section 17. The period from 1 November of each year until 31 May of the following year shall be designated as the priority fire-prevention period.

During such period, use of fire in outlying areas in grade-one zones shall be prohibited. In grade two and three zones, grassfires, funerary burnings, and bonfires shall be prohibited.

Where special exigencies require the use of fire, in grade one zones, permission shall be granted by the district or county people's government or bodies so authorized by such governments. In Grade two and three zones, assent shall be secured from the village or township government or from rural farm committees appointed by such governments. The unit or individual using such fire shall assume responsibility for overseeing the site.

Section 18. Should a fire occur upon forest lands, the local people's government shall immediately organize the people and militia and concerned departments to put it out. All units and individuals shall provide assistance in putting out the fire.

Section 19. Reclamation, quarrying of stone and gravel, earth-removal, and other destructive activities shall be prohibited upon forest lands.

Grazing and woodcutting shall be prohibited upon immature, special-use, and close hillside forest lands, as well as upon slopes exceeding 25 degrees.

Section 20. The municipal forestry bureau and district and county forestry (rural forest) bureaus should come forth with forest disease and pest forecasts and predictions, and strengthen the work of controlling and inspecting for forest diseases and pests. The municipal government shall draft methods for inspecting forests for diseases.

Section 21. Trapping of wild animals accorded protection by municipal ordinance shall be prohibited.

Article IV. Approval of Wood Harvesting

Section 22. Rational wood harvesting shall be maintained, and the amount of wood harvested shall be strictly controlled. Harvesting and thinning of growing

forests shall be by a license in accordance with law. The primary department inspecting and issuing a license must follow the relevant strictures of the "Forestry Law."

Cutting and thinning on municipal state-run tree farms shall have licenses inspected and issued by district and county forestry (rural forest) bureaus, who shall report such to the municipal forestry bureau.

Licenses for the harvesting of renewed forests and thinning on forest lands belonging to municipal highway, water conservancy, and rail departments shall be inspected and issued by the district and county forestry (rural forest) bureaus.

Licenses for wood harvesting and thinning by grassroots economic organizations owning forest rights shall be inspected and approved by district and county forestry (rural forest) bureaus.

Licenses for the harvesting of forests by farmers upon personally held mountains and shorelines shall be inspected and issued by district and county forestry (rural forest) bureaus or village and township governments authorized by such.

Section 23. The harvesting of wood from privately owned firewood preserves shall be by acknowledgement of the district or county forestry (rural forest) bureau and shall not require any application for license.

Application for license is also unnecessary for farmers harvesting wood from their own courtyards and of trees within the legal curtilage of their households.

Section 24. When a state-run tree farm requests a license to harvest wood, it must come forth with documents detailing an inspection plan for the harvested area. When another unit applies for a harvesting license, it must set forth the purpose, location, type of forest, type of tree, forest age, area, potential, method of cutting, and measures for renewal and nurture.

Section 25. Units and individuals harvesting wood must abide by the various provisions of the license. Organs issuing licenses shall have the authority to rescind them for violators, halt such harvesting, and follow through upon corrections.

Article V. Incentives and Penalties

Section 26. Units and individuals exhibiting manifest achievements in conscientiously implementing the "Forestry Law" and these regulations to protect forest resources, along with personnel responsible for seeking out and identifying activities destructive of forest resources shall be given moral and material rewards by all levels of the people's government.

Section 27. Those violating the relevant regulations of the "Forestry Law" to whom legal responsibility has been ascribed shall be dealt with in accordance with sections 34, 35, 36, 37, and 38 of that law.

Section 28. Those violating the fire ordinances of Section 17 of these regulations shall be fined from 2 to 20 yuan by the primary forestry bureaus, village or township people's governments, or units authorized by such governments, based upon the circumstances.

Those using fire on forest lands in violation of the "Regulations on the Management of Public Security of the People's Republic of China" may, in addition to prosecution in accordance with law by the relevant public security organs, be ordered to pay fines or damages by the primary forestry bureaus or village and township people's governments according to law for one to three times the value of the trees destroyed.

Those lighting fires which destroy forests or those who, through negligence, are charged criminally with starting a fire shall be punished in accordance with law.

Section 29. Those violating Section 19 of these regulations resulting in destruction of forest resources shall pay compensation fixed by primary forestry departments, or village or township people's governments in accordance with law, and shall plant from one to three times the number of trees destroyed, and may be also fined.

Section 30. Those employing violence or threatening tactics to obstruct the work of forestry or forest-protection personnel shall be prosecuted according to the law, and shall be accorded criticism and reeducation, administrative processing, or direct criminal prosecution as circumstances require.

Section 31. All levels of cadres, forestry personnel, or rangers directing, allowing, or harboring those who have destroyed forest resources, harvested wood in excess of their authority, or failed to abide by the law and thus resulting in damage to forest resources may be dealt with administratively or prosecuted criminally in accordance with the law, depending upon the gravity of the circumstances.

Section 32. Those who have been fined by primary forestry departments or village or township people's governments who protest such decision may, within 1 month of the day of notice of the fine, bring suit in the people's court. For those not bringing such action or abiding by such decision within the said period, the primary forestry bureau or village or township people's government may request compulsory enforcement by the court.

Article VI. Appendix

Section 33. Concrete questions concerning these regulations shall be answered by the Beijing municipal forestry bureau.

Section 34. These regulations go into effect on 1 October 1985. The "Temporary Methods for Protecting and Managing Forest Resources of Rural Beijing" promulgated on 27 December 1983 are hereby canceled.

FUJIAN

GOVERNOR DISCUSSES GRAIN PRODUCTION

HK240327 Beijing ZHONGGUO XINWEN SHE in Chinese 1416 GMT 22 Oct 85

[Text] Fuzhou, 22 Oct (ZHONGGUO XINWEN SHE)--At the fourth meeting of the Sixth Fujian Provincial People's Congress, which opened today, Governor Hu Ping said that Fujian will never relax grain production, will vigorously develop diversified undertakings, and will take active and prudent steps in reorganizing the rural production structure.

It has been learned that due to various factors, such as the readjustment of agricultural structure, a reduction in the area sown with grain, fairly serious natural disasters, and a considerable drop in grain output, the gap between grain purchases and sales has widened this year. In a strong effort to reap bumper harvests in late rice and winter barley and wheat, Fujian Province has allocated 20,000 tons of chemical fertilizer and extended credits amounting to 5 million yuan.

Hu Ping said: The reform of the rural economic structure in Fujian Province, which has been carried out by instituting the contract responsibility system and readjusting the production structure, has attained marked successes. However, Fujian's agriculture, which is the foundation of the national economy, is still relatively fragile and its development is also uneven. To a certain extent, we will have to depend on heaven for food. Particularly because Fujian is a grain-deficient province, we must not treat the grain problem lightly.

To maintain stable grain production in the province, Governor Hu Ping said that the area of the province sown in grain will be restored to more than 29 million mu next year.

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CSO: 4007/73

FUJIAN

DEREGULATION OF HOG PRICES DISCUSSED

Fuzhou FUJIAN LUNTAN [FUJIAN FORUM] in Chinese No 6, 1985 pp 26-27, 30

[Article by Wu Liangcan [0702 0081 3503]: "Price Reform--A Discussion of Issues Related to Deregulation of Hog Prices"]

[Text] A major reform of the agricultural product purchasing system is to eliminate assigned procurement of hogs and to follow the spot market. But will deregulating the hog marketing price bring about a price rise in turn? How can we effectively control the chain reaction? In this article I present my views on many questions such as these that are being discussed by people in the urban and rural areas.

I. Deregulation of Hog Prices Is Imperative

The hog centralized and assigned procurement system played an important role under the specific historical conditions of the past, but the disadvantages of this system became more and more prominent as a result of developing circumstances. One reason was that the assigned procurement price for hogs deviated seriously from value, which made it difficult for the peasants to be enthusiastic about raising hogs and engendered only a slow rate of increase in production. There were 7,614,400 head of hogs on hand in Fujian in 1984, which was only a 2.17-percent increase over 1983; the number slaughtered increased 1.42 percent and the slaughter rate remained static. The amount of pork consumed in 1984 averaged 34.76 jin per person, which was only a 1.6-percent increase over 1983. The intense contradiction between supply and demand forced prices of non-staple foodstuffs to rise year after year in the cities and towns. The 1982 retail price index of meat, poultry and eggs was 29.79 percent higher than in 1978, the negotiated sales price rose 9.5 percent, and the market price rose 12.48 percent. The rise in the list price and market negotiated price of pork continued in the first half of 1983 and 1984, and they gradually stabilized in the second half of the year. The increase from the beginning of this year to the present has been even greater; there was a 7.1-percent rise in January and February alone.

Another disadvantage of implementing the assigned procurement system for hogs was that the volume of financial subsidies became greater and greater as pork consumption increased. Since the state subsidy was more than 0.50 yuan per jin of pork consumed by the people residing in the cities and towns, the

amount of the province's finances that went to subsidize non-staple foodstuffs in 1983 was 4-fold greater than in 1978. Subsidies for pork alone amounted to more than 90 million yuan; based on the population of the cities and towns, this was a yearly subsidy of 27 yuan per person. The volume of subsidies continued to increase in 1984 and the financial burden grew heavier and heavier. Only by abolishing assigned procurement and consciously proceeding according to the law of value can we accelerate hog production, make prices relatively flexible while rationally guiding production and consumption, and maintain price stability and a balance between market supply and demand.

II. Forecasting the Market Price Trend Following Hog Price Deregulation

There could be an initial rise in the market price of pork when hog prices are deregulated; the primary reasons for this are:

1. The assigned procurement price for hogs tended to be low over the long term, so naturally it could rise somewhat after deregulation due to the influence of the law of value. The livehog assigned procurement price in the province since April 1974 was 62.11 yuan per hundred jin for young hogs (class 3 young hogs), which is quite a bit lower than the market price level of 95 to 100 yuan per hundred jin. Even adding on the piglet subsidy and award grain price differences after 1982, the actual purchase price was only 82 yuan. For various reasons, the cost of raising hogs has continually increased in recent years while there has been no corresponding rise in the marketing price, and the purchase price currently in effect is barely sufficient to pay material expenses. According to survey data on average costs in the major production areas provincewide for the 5-year period 1979 to 1983, the material costs for livehog production in Fujian amounted to 77.46 yuan per 100 jin, with 17.25 man-days in labor; calculated according to the unified 1.50 yuan per day of labor value (which is lower still than the average social wage level for the province) there are 103.34 yuan in costs tied up in each dan of liveweight. Based on this, the sales price of pork (all meat cuts inclusive) should be on the order of 155 to 160 yuan. Furthermore, in terms of comparable prices, the hog to grain price ratio in Fujian has not been rational. Both times that hog and grain prices were restructured after liberation, grain prices were raised higher than young-hog prices. Paddy rice prices were raised 75 percent from 1959 to 1979 while hog prices were raised only 60 percent. Prices were restructured in 1981; paddy prices were raised 21.4 percent and young-hog prices were raised only 17.3 percent. At the same time, the peasants sold more and more grain to the state at the above-quota added price, there was an increase in the above-quota added price ratio, and the real purchase price average grew higher and higher. Although the awards and price subsidies for livehog purchases also increased somewhat, the real income for the peasants from raising hogs still could not compare with that for growing grain, and was even lower compared to incomes from producing other farm products or from engaging in industrial and sideline production. It could therefore be said that a certain price increase following hog price deregulation, as opposed to former hog price subsidies which deviated from value, was an unavoidable phenomenon in the restructuring and enlivening process.

2. The government adopted administrative measures in the past to interfere with pork sales prices, the Ministry of Finance implemented extraprice subsidies and the market price was relatively low. Following deregulation of the livehog marketing price and elimination of financial subsidies, the state-operated foodstuff departments will no longer supply par value pork, and the market price and negotiated price inevitably will rise somewhat higher than previously.

3. Per-capita meat levels in Fujian in recent years have been some of the highest in the nation. Demand is still expanding continuously at the present time, but because the growth rate in hog production cannot keep pace with the increase in demand, every year 700,000 to 800,000 head of hog must be brought in from outside the province. Such a contradiction between supply and demand is difficult to balance in the short term, and it inevitably will lead to a rise in hog prices.

4. After implementing the "reversed 3:7"-ratio planned price for grain, there will be a 9.3-percent increase in the real purchase price per dan of paddy in the province on the average compared to 1984. After putting the grain price in order, the sales price of feed grain will increase 35 percent over the one currently in effect and production costs will rise, which will lead to a rise in pork prices.

However, the extent of the rise in the livehog market price cannot be too great because it will be restricted by several factors.

First, deregulating hog prices will help expand production and the peasants will be more enthusiastic about raising hogs, so after one or two production cycles there will be a large increase in the amount of pork supplies available. The situation in Fujian is such that the potential for expanding hog production is considerable. At the present time there is only an average of 0.12 head of hog per mu in the mountain areas of northern Fujian; the average is 2.5-fold greater in southern Fujian where there is a lack of grain. If the level of hog production in the north could catch up to that in the south, then Jianyang Prefecture alone could supply an additional 1.2 million-plus head of big porkers.

Second, utilizing compound feeds and feed additives will bring about a large decrease in hog-raising costs. Young hog costs are currently as high as 100 yuan per 100 jin, mainly because hog-raising methods are primitive and both the slaughter ratio and the grain conversion ratio are low; it takes 16 to 17 months on the average to raise a hog. Utilizing compound feeds to raise hogs offers a breakthrough for expanding animal husbandry in the province at the present time, and it is only a matter of time before they are in general use. Compound feeds cut down on the hog-raising period; only about a half a year is required to raise a hog on the average, and since the feed conversion ratio is high, costs could quickly be reduced.

Third, an increase in available supplies of poultry, eggs and milk could slow the rate of increase in pork consumption. The poultry-raising cycle is short, meat output is comparatively high, the feed return is high, it is suitable for

mechanized breeding, and it can expand greatly in the short term, which can mitigate the meat supply and demand contradiction and play a large role in keeping down the price of pork.

Fourth, although the people's standard of living is improving rapidly at the present time, income and consumption levels both are still at a relatively low stage throughout society. Consumption could be limited if market prices are too high, and this also is decisive in keeping the market price of meat from getting excessively high in the province.

The net result of the influencing factors mentioned above is that the pork sales price in Fujian will rise to about 160 yuan per 100 jin and stabilize at 155-165 yuan. After a period of time (one or two production cycles) the price will fall off somewhat, but the drop will not be too great. Because of the rising standard of living and the consumption habits of the residents, the price difference between lean and fat pork, and between fresh and frozen pork, will expand from now on and the lean pork price may be 50 to 100 percent higher than other meats.

III. Successfully Controlling the Chain Reaction

As of the present, hog prices have been deregulated in 36 counties (cities) in Fujian. The situation in each locality after deregulation is fine: 1) there has been an increase in the amount of pork put on the market, the market price has been basically stable and the rise has not been very extensive; 2) after the price went up there was an increase in peasant incomes, which promoted expansion of the hog-raising industry; 3) implementing multi-channelled operations promoted competition, raised the quality of services of state-run commercial enterprises, and eliminated such unhealthy tendencies as "entering by the back door"; 4) the state changed the city and town residents' meat eating from "hidden nourishment" to "open nourishment," brought genuine material benefit to the consumer, helped both to put meat prices in order and to bring stability and solidarity, and guaranteed that reform would be carried out smoothly. Judging from the practice of the various localities, the key to deregulation of hog prices is to make ample preparations and successfully control the chain reaction. The major steps are:

1. Prior to deregulating hog prices, food management departments must have adequate resources to ensure supplies; state-run units must actively participate in negotiated purchases and sales, keep down meat prices in the marketplace, and ensure that they do not get out of control.

2. Select an opportune time for deregulation. For the large and mid-sized cities and major industrial and mining regions it would be best if we chose the peak hog production season of May and June, when available supplies are plentiful and the weather is getting hot; it will be somewhat easier to balance supply and demand when there is a drop in the amount of meat consumed by the masses.

3. Before the wage system is restructured, consumers must be given an appropriate subsidy which will ensure that their real standard of living will not drop because of deregulating hog prices.

4. Do a good job of actively organizing hog production, support the feed industry, devote major efforts to developing compound feeds and employ scientific methods to raise the conversion ratio for greenfeed and coarse fodder; these are the basic measures for guaranteeing stable meat prices in the marketplace.

12513/12948
CSO: 4007/463

FUJIAN

RURAL FUJIAN BOOSTS PRODUCTION FOR EXPORT

OW281200 Beijing XINHUA in English 1142 GMT 28 Oct 85

["Southern Fujian Gears Up for Open Policy (1)"--XINHUA headline]

[Text] Fuzhou, October 28 (XINHUA correspondents)--Peasants and authorities in southern Fujian Province are busy orienting rural production to export to meet the needs of opening to the outside world.

Xiamen, Zhangzhou and Quanzhou cities and eight counties under their jurisdiction have drawn up plans to boost commodity production since the State Council opened the coastal area to foreign trade and investment earlier this year.

Instead of concentrating on grain, they are promoting cash crops, the raising of fowl and fish and food processing.

As agriculture accounted for 56 percent of the area's total output value last year, and most of its seven million inhabitants are engaged in grain production, local officials have given top priority to readjusting the rural economy.

People in this subtropical region have made intensive efforts this year to plant fruit trees, such as red bayberry, litchi, orange, longan, banana and pineapple, and flowers and ornamental plants in hilly areas. Farmland accounts for only a quarter of the region which covers 13,000 square kilometers.

Local officials of the region also stressed the importance of development beach and inshore areas, which cover 200,000 hectares.

Peasants in Zhangpu County are breeding prawns, oysters, razor clams, scallops and fish across 3,000 hectares this year--double the area of last year. Local prawns and oysters sell well in Hong Kong and Japan.

Farmers in Zhangzhou city and three nearby counties have converted low-yield paddy fields into orchards and flower nurseries or have planted them with medicinal herbs.

Meanwhile, villages and towns in the region are expanding their processing industries for exports.

Longhai County in Zhangzhou has set up 500 rural enterprises to process aquatic products, fruit, dehydrated vegetables, fowl and edible fungi so far this year. And other counties are planning to import processing and packaging facilities.

To meet the needs of the international market, cities and counties have imported superior strains of fruit trees and better breeds of pigs, oysters and other aquatic products.

Plans to improve local infrastructure include a harbor at Quanzhou, a railway station at Zhangzhou and roads in hilly areas.

When visiting the coastal region earlier this year, provincial Communist Party committee secretary Xiang Nan encouraged local people to further readjust the economic structure to help boost exports.

/6662

CSO: 4020/61

GANSU

GANSU MAKES PROGRESS IN CONTROLLING SOIL EROSION

OW120952 Beijing XINHUA in English 0643 GMT 12 Oct 85

[Text] Lanzhou, October 12 (XINHUA)--Northwest China's Gansu province has reported good results in controlling water loss and soil erosion on the loess plateau.

Up to the present, 23.7 percent of the areas suffering from water loss and soil erosion, or about 30,000 sq km of the loess plateau, has been brought under control.

Gansu province is one of the areas in China suffering the most serious soil erosion. The Yellow, Weihe, Jinghe and other rivers in the province used to wash away an estimated 500 million tons of sand and soil annually and the overcultivation and overgrazing in the area have aggravated the situation.

Since 1979, a large scaled drive has been launched to plant trees and grass and build soil control projects with local government aid. In the period from the beginning of last year to the present, more than 529,000 hectares have been afforested and another 330,000 hectares have been planted with grass.

Now the green cover on the loess plateau has increased from 8.67 percent in 1979 to the present 17 percent.

Peasants along the banks of the Weihe, Jinghe and other rivers have also carried out comprehensive control schemes to check water loss and soil erosion by building terraced fields, dykes and irrigation works.

The projects have not only checked water loss and soil erosion, but also brought in more income to local peasants.

The average annual grain production per capita in 69 of Gansu's soil-eroded counties and regions reached 265 kg in 1984, an 11 percent increase over that in 1979. The average annual income of each farmer in the counties in 1984 also tripled that in 1979.

CSO: 4000/36

GUANGDONG

BRIEFS

SUMMER GRAIN QUOTAS OVERFULFILLED--[Report: "Guangdong Province Put an Excess of Around 400 Million Jin of Summer Grain in Its Granaries"] Following the overfulfillment of the province's summer grain storage quotas on 10 September, all localities throughout the province made greater efforts and created conditions for storing more grain and fulfilling the annual grain purchase quotas. By the end of September, the whole province stored more than 3.98 billion jin of summer grain, 380 million jin more than the plan and accounting for 83 percent of the annual storage quotas. [Text] [Guangzhou NANFANG RIBAO in Chinese 19 Oct 85 p 1 HK]

HAINAN RESTORES AGRICULTURAL PRODUCTION--After being repeatedly hit by typhoons, various counties on Hainan Island strove to restore production. As at 30 October, the district rush-harvested over 320,000 mu of late rice; quickly took care of 47,900 mu of rubber trees, 5,000 mu of pepper, and 400,000 mu of sugar cane; afforested over 35,000 mu of land; planted over 10,000 mu of herbal medicine; and swiftly harvested over 5,000 mu of fruits and other crops. In addition to the 2.07 million yuan of relief fund allocated by the province, including 700,000 yuan to the autonomous prefecture, Hainan allocated 620,000 yuan and the autonomous prefecture allocated 1.2 million yuan. They also provided grain, chemical fertilizer, oils, cement, building materials, timbers, fuel and so on to the disaster areas. /Summary/ /Haikou Hainan Island Service in Mandarin 0400 GMT 1 Nov 85/

GUANGDONG SPECIAL ZONE AGRICULTURE--Over the past 3 years and more, the agricultural area in Shantou special economic zone, Guangdong Province, has made profits of 3.67 million yuan and earned foreign currency of \$4.04 million from exports. It has become one of the units in the special economic zone whose economic results are better and which have earned more foreign currency and have a surplus of foreign currency. [Summary] [Guangzhou Guangdong Provincial Service in Mandarin 0400 GMT 17 Oct 85]

CSO: 4007/51

GUANGXI

CIRCULAR ON WINTER FARMWORK ISSUED

HK291345 Nanning Guangxi Regional Service in Mandarin 1130 GMT 24 Oct 85

["Circular of the regional people's government on vigorously developing winter farmwork"]

[Excerpts] The circular says that as our region is situated in a sub-tropical zone, it has excellent natural conditions for developing winter farmwork. The masses have winter farming customs and experience in production. Grasping season winter farmwork firmly and well, increasing production of grain, oil-bearing crops, and other agricultural products, and raising economic results is of special significance for carrying out the mass activities of providing for and helping ourselves by engaging in production because our region suffered from serious natural disasters. Governments at all levels, responsible departments, and rural grassroots construction work teams must strengthen leadership over winter farmwork, must carry out extensive propaganda, and must penetratingly mobilize the masses to take effective measures to do winter farmwork well this year.

The stricken areas must grow more grain, potatoes, and beans as far as possible so as to resolve difficulties in grain rations in spring famine next year. To meet the needs of the urban markets for nonstaple food, urban suburbs and rural areas in the vicinity of an urban area must make good arrangements for production of vegetables, poultry, fish, meat, and eggs, must suitably expand vegetable-growing areas, must increase varieties, and must improve quality. Places in general must ensure that they pay equal attention to the production of grain, oil-bearing crops, and other crops. In general, regarding the fields on which winter crops have not been sown, it is necessary to promptly plow them up and make good preparations for spring farming.

The region has transmitted a guiding plan for winter farmwork this year. All places must carry it out at the basic levels as quickly as possible and must strive to complete it. In coordination with one another, all departments concerned must do well in serving winter farmwork. Agricultural departments must send cadres and science and technology workers down to help the masses formulate plans for winter farmwork, popularize agricultural technological knowledge, strengthen technological guidance, popularize suitable technology, develop contracts for giving technological assistance, and increase per-mu yield.

GUANGXI

GUANGXI HOLDS CONFERENCES ON IMPORTANCE OF WINTER FARMING

HK171005 Nanning Guangxi Regional Service in Mandarin 1130 GMT 14 Oct 85

[Text] According to GUANGXI RIBAO, agricultural departments in the region held conferences in Guilin and Wuzhou Prefectures from 6 to 10 October. The conferences demanded that all areas in the region treat winter farming as an important task and strengthen their leadership over it.

The participants studied documents, made visits, listened to introductions, and held discussions. At the conferences leading comrades of the regional agricultural commission and the regional agriculture, animal husbandry, and fishery department delivered speeches on relevant problems.

The conference held that the peasants in the region have long been in the habit of doing winter sowing. From the 1960's to the 1970's the annual winter sowing area for the region was over 10 million mu. Since the start of the 1980's, some peasants and cadres have had the incorrect idea that winter sowing is unimportant and insignificant, resulting in the continuous reduction of winter sowing areas in the region and repeated decreases in output.

It is necessary to educate cadres and peasants to overcome the idea of ignoring winter sowing and to sum up and promote previous typical experiences in developing winter farming and increasing income. It is necessary to let the masses understand that as the region has had a poor harvest this year due to natural disasters, properly carrying out winter farming can not only provide material conditions for tiding over a lean year next year, but can also provide funds and manure for next year's spring farming. It can thus ensure agricultural production and arouse the enthusiasm and raise the consciousness of the masses in making the winter farming a success.

Governments at all levels must effectively strengthen their leadership over the winter farming. Agricultural, grain, and commercial departments must take effective measures to properly carry out various service work so as to ensure the fulfillment of the winter farming.

CSO: 4007/51

BRIEFS

GUANGXI FRUIT HARVEST--Nanning, 13 Oct (XINHUA)--The twin factors of rural reform and scientific farming will boost fruit output to a record 365,000 tons in the Guangxi Zhuang Autonomous Region this year. The local government has since 1981 invested a total of 2 million yuan in the development of 13 large sapling nurseries to provide improved fruit saplings for fruit growers, and aided them with technology, fertilizer and farm chemicals. To boost fruit production, the regional government received 70.93 billion U.S. dollars in loans from the World Bank last year to build subtropical fruit production centers. There are now 20 such centers mainly producing bananas, lichees, pineapples and other fruits. More than 13,000 hectares have been planted to such fruits so far. /Excerpts/ /Beijing XINHUA in English 0850 GMT 13 Oct 85/

CSO: 4020/43

GUIZHOU

MEETING HELD ON FULFILLING AUTUMN SOWING PLAN

HK290914 Guiyang Guizhou Provincial Service in Mandarin 2300 GMT 23 Oct 85

[Excerpts] Yesterday evening the provincial CPC Committee and the provincial People's Government held an emergency telephone conference on autumn sowing, calling on all localities in the province to try every conceivable means to fulfill the autumn sowing task in the half month before the beginning of winter [the 19th solar term in the Chinese calendar].

Hu Jintao, secretary of the provincial CPC Committee, presided over the telephone conference. Provincial Governor Wang Chaowen spoke at the conference. Wang Chaowen demanded that autumn sowing be treated as the central task in rural areas in the next half month. He said that CPC committees and governments at all levels and the vast number of rural grassroots cadres must fully understand this and go all out to grasp autumn sowing. All other work must be carried out around this main task. If something conflicts autumn sowing, the other task must yield to autumn sowing.

The governor stressed that it is necessary to strengthen leadership over autumn sowing. Except for a handful of persons in charge of routine office work, most responsible comrades of all county CPC committees and governments must lead cadres of all departments to go to the frontline of autumn sowing and practice the contract system to make autumn sowing a success. Cadres at district and township levels must be steadfast at their posts and must not leave their posts without permission. It is necessary to practice the contract responsibility system in autumn sowing and to assume responsibility and execute contracts level by level.

In conclusion, Wang Chaowen said that after the fulfillment of the autumn sowing task, all localities must promptly carry out field management. Sowing is the foundation, and field management is the key. It is necessary to ensure the healthy growth of young plants so as to lay down a good foundation for reaping a bumper harvest in grain and oil crops next summer.

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CSO: 4007/69

HEBEI

HEBEI FORESTRY PRODUCTION IN SIXTH 5-YEAR PLAN

SK180707 Shijiazhuang HEBEI RIBAO in Chinese 3 Oct 85 p 1

[Text] During the Sixth 5-Year Plan period, our province conscientiously implemented the party's forestry policies and mobilized the enthusiasm of the broad masses of peasants to plant fruit trees.

Forestry production increased annually and the major forestry production targets were overfulfilled ahead of schedule. From 1981 to 1984, the province as a whole afforested more than 15 million mu. It is possible to exceed the target set by the Sixth 5-Year Plan by more than 70 percent if this year's afforested areas are added. The annual average afforested areas was 1.5 times of 1980.

In the first-phase construction of the forest shelterbelts in Northwest, North, and Northeast China, under the plan, our province should afforest 6.45 million mu by the end of 1985. By the end of last year, we had afforested more than 11 million mu and preserved 5.24 million mu of afforested areas, meeting the demands set in the plan. In the first-phase construction of the forest shelterbelts, we will afforest more than 7 million mu, exceeding the plan by 580,000 mu. The rate of forest cover may reach 29.3 percent, an increase of 6.3 percent. The afforesting structure was basically rational. The ecological and economic results were fairly obvious. This will basically bring 14 million mu of water and soil eroded areas under control and will minimize the harms caused by windstorms and drifting sand. The annual frost-free period will be generally extended by 5 to 6 days. Some localities were basically self-sufficient in the supply of rafters. Thus we will have a supplement of firewoods and fodder grass for livestock.

The progress of tree planting on barren hills was accelerated. The province as a whole had contracted 86 percent of the afforestable areas, and barren hills (beaches) to households as private hills and responsibility hills for afforestation. So far, some 9 million mu of trees have been planted.

In the past few years, the upsurge in planting fruit trees has continued in the province. In the first 4 years of the implementation of the 5-year plan, the province as a whole planted a total of some 2 million fruit trees. Last year alone, some 1 million mu of fruit trees were planted. Our province successively created all-time records in fruit output. New progress was made in the processing and sales of fruits.

Our province has steadily developed afforestation on plains. The province's accounting for over 50 percent of the afforestable areas.

CSO: 4007/51

HEBEI

BRIEFS

PEASANT INCOME INCREASE--According to the data offered by the provincial Statistics Bureau, during the "Sixth 5-Year Plan" period, the income of the peasants of all localities of the province increased remarkably. According to a sample survey of rural areas in the province, in 1984 the per-capita net income of the peasants reached 345 yuan, an increase of 96.3 percent over 1980. The per-capita net income of the peasants ranked the province in 21st place in 1981 and 15th place in 1984 among all provinces, autonomous regions, and municipalities of the country. The per-capita income increased by a big margin. Per-capita net income in 1984 increased by 96.2 percent over 1981, showing an average annual increase of 18.4 percent. The average annual increase rate of the province was 1.7 percent higher than the national average. The growth rate of net income from productive undertakings was higher than that from nonproductive undertakings. Comparing 1984 with 1980, net income from productive undertakings in 1984 was 299.7 yuan, a 1.1-fold increase over 1980. The net income from nonproductive undertakings was 45.3 yuan, an increase of 29.8 percent over 1980. [Text] [Shijiazhuang HEBEI RIBAO in Chinese 9 Oct 85 p 1 SK]

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CSO: 4007/73

HEILONGJIANG

COMMENTARY VIEWS GRAIN PRODUCTION

SK300056 Harbin Heilongjiang Provincial Service in Mandarin 1000 GMT
28 Oct 85

[Station commentary: "We Must Never Ignore Grain Production and Enthusiastically Develop a Diversified Economy."]

[Excerpt] Agriculture is a foundation of the entire national economy while grain is the foundation of agriculture. We must further pay full attention to and never ignore the development of grain production when it is rather good.

Our province's grain output surpassed 30 billion jin for 2 successive years. This year the province still reaped better grain harvests for the rural cadres, and people across the province have waged struggles against such natural disasters as spring drought and autumn floods. A majority of cadres and peasants have paid high attention to the issue concerning grain production. More and more people have an understanding of the principle that the economy is steady with good grain production but confused without good grain production. Some areas have slackened their leadership of agriculture and failed to firmly attend to agricultural production. Some areas have placed more stress on the watchwords No Industry, No Wealth than the watchwords No Agriculture, No Steady Economy. So they do not have too much enthusiasm for cultivating lands, tendencies of giving up agricultural production to be engaged in industrial production and business have emerged, and even some farmlands lay in waste. The reasons for these problems are the leaders in these areas have failed to correctly handle the relations between agriculture, industry and commerce, or not placed agricultural production in the basic position.

Along with the gradual readjustment of the agricultural production structure, it is essential that some peasants engage in industrial production and business after being separated from cultivating farmland. However, they must never give up agriculture only because of the readjustment of the agricultural production structure. Since the 3d Plenary Session of the 11th CPC Central Committee, we have drawn benefits from the principle that the economy is steady with good grain production. But we must never forget good grain production.

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CSO: 4007/69

HEILONGJIANG

BRIEFS

HEILONGJIANG CATTLE RAISING--Harbin, 31 Oct (XINHUA)--Heilongjiang Province, China's leading dairy-producing center, has 25 percent more dairy cattle this year than last. According to the Provincial Animal Husbandry Bureau, as of 25 September this year there were 254,000 head as against 203,000 last year. A bureau official estimated that the province would have 2 million head of dairy cattle by the end of the century. More cattle began to be raised in the province in 1979 when the rural responsibility system, linking income to output, was instituted. The province has 245 villages and 22,000 households specializing in raising cattle. There are 18 stud farms and more than 3,000 stations where frozen semen is stored for artificial insemination and improvement of Holstein herds. The province has imported 1,200 head of cattle from Denmark, the Federal Republic of Germany, and the United States. Dairy plants have increased from 34 in 1978 to 116 at present and the daily processing capacity of powdered milk has gone from 300 to 1,700 tons. /Text/ /Beijing XINHUA in English 1138 GMT 31 Oct 85/

GRAIN OUTPUT--This year Heilongjiang Province still may reap a better grain harvest despite serious disasters. The total grain and soybean output of the province will reach 27 to 28 billion jin. [Summary] [Harbin Heilongjiang Provincial Service in Mandarin 1000 GMT 16 Oct 85 SK]

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CSO: 4007/73

HENAN

PEASANTS ADOPT ENERGY-SAVING MEASURES

OW011247 Beijing XINHUA in English 1141 GMT 1 Nov 85

[Text] Zhengzhou, November 1 (XINHUA)--Peasants in Henan Province have helped ease chronic energy shortages through using fuel-saving ovens and biogas (methane) pits and digging small coal mines, a provincial official here said.

There are now 3,350,000 fuel-efficient ovens, 55,000 biogas fermenting pits, 3,100 small coal mines and 1,584 small thermal or hydroelectric power stations in the province's rural areas.

The ovens use only about half the fuel normally burnt by traditional ones.

In the past, fuel shortages have lasted for more than three months a year in half the 110 counties in Henan, China's second most heavily populated province.

Peasants had to cut trees or dig up grass roots, resulting in disruption of the ecological balance, soil erosion and dust storms.

In recent years, provincial authorities have trained peasants in energy-saving techniques, provided cash aid and adopted other measures to encourage peasants to use fuel-saving ovens, biogas pits and small coal mines.

The small mines produced 15 million tons of coal last year, not only meeting local domestic needs, but also supplying industries with fuel.

The official of the provincial agricultural bureau gave as an example Xinxian County in southern Henan where peasants once burned furniture to cook and keep warm.

Now, 95 percent of the families there are using fuel-saving ovens, and a number of towns and villages are lit with electric lamps thanks to the county's 49 small hydroelectric power stations.

Energy-saving measures have also been adopted in the production of tea, tiles and bricks, limestone and pottery and the processing of farm produce, the official added.

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CSO: 4020/63

HENAN

BRIEFS

HENAN AUTUMN FARMWORK--According to statistics as of 10 October, except for Puyang, 16 prefectures and cities in Henan Province had reaped autumn crops on some 55 million mu, prepared some 42 million mu of soil, and sown wheat on some 9.7 million mu. Farmwork was faster than in the same period last year. [Summary] [Zhengzhou Henan Provincial Service in Mandarin 1030 GMT 14 Oct 85]

CSO: 4007/51

HUBEI

BRIEFS

1985 GRAIN OUTPUT RECORD--Wuhan, October 28 (XINHUA)--Grain output in Hubei Province, one of China's major grain producers, will be the second harvest year on record. Output is expected to come to 21.5 million tons of grain and 500,000 tons of cotton, according to the provincial bureau of agriculture. Edible oil, pigs, poultry, eggs, fish, farm and sideline production and rural industrial output all set new records this year. The province caught a total of 360,000 tons of fish, up 26.3 percent over the previous peak year. The province this year turned 173,000 hectares used for grain and cotton to develop diversified economies while encouraging scientific farming. The grain output per unit increased by two percent over the previous peak year, the bureau said. [Text] [Beijing XINHUA in English 0712 GMT 28 Oct 85 OW]

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CSO: 4020/63

HUNAN

HUNAN REPORTS IRRATIONAL IMPOSITIONS ON PEASANTS

HK040229 Changsha Hunan Provincial Service in Mandarin 1100 GMT 3 Nov 85

[Excerpt] A letter from station correspondent (Luo Junxiong) reports that many rural areas in the province have failed to make a correct estimate of the peasants' degree of affluence and have thus gone in for excessive raising of capital and imposition of charges on them. Some of these practices are obviously irrational, and quite a number are used to set up various welfare undertakings. Although they appear rational on the surface, in fact they represent too heavy a burden on the peasants. Thus a good thing turns into a bad one.

The letter appeals to the cadres at all levels to take as their guide the 1 November circular of the CPC Central Committee and State Council on putting a stop to indiscriminate impositions and charges on the peasants, and make an all-round survey of the peasants' burdens. Irrational burdens must be resolutely abolished. Projects that appear rational but are in fact excessive in number should be suitably reduced. We must act according to our capacity.

The letter says: According to statistics compiled by provincial departments concerned, the average income of the province's peasants last year was only 270 yuan. The income of 30 percent of the peasants was below 200 yuan. Only 7 percent of townships and towns had an average per-capita income higher than 400 yuan. However, a township in a certain county had as many as 27 projects requiring impositions and charges on the peasants, amounting to 51 yuan per person, representing 12 percent of their income. Certain units and departments even stretch out their hands to the peasants for cash under a variety of pretexts, thus adding to the peasants' burdens.

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CSO: 4007/81

HUNAN

BRIEFS

PEASANTS EARN MORE INCOME--Rural areas in the province have actively readjusted the production structure this year and greatly developed commodity production. Therefore, the cash income of peasants has sharply increased. According to a survey by the provincial statistics bureau, in the first three quarters of this year the peasants' cash income after deducting loans totalled 239.74 yuan, an all-time high compared to the same period last year. Both the per-capita cash balance in hand and bank deposits of the peasants increased by 9.3 percent. Furthermore, the cash expenditures of the peasants also increased by 29.7 percent over the same period last year. [Text] [Changsha Hunan Provincial Service in Mandarin 1100 GMT 31 Oct 85 HK]

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CSO: 4007/73

JIANGSU

GOVERNMENT URGES RUSH REAPING, PLANTING

OW281157 Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 25 Oct 85

[Excerpts] The Jiangsu Provincial People's Government issued an emergency circular today urging the people throughout the province to accelerate the draining of waterlogged cropland and exert every effort to reap and plant.

The circular says: Due to typhoons and [words indistinct], the whole province has had an unbroken spell of wet weather for about 2 weeks. Compared with the same period of a normal year, the rainfall this year has increased by four to nine times, and the number of sunny days is only one-sixth as much. It is expected that the weather will continue to be overcast and rainy in the near future. Because of the extent of these natural disasters--which have not been experienced for many years--autumn harvesting and planting have been seriously obstructed. Today the reaping of the province's 15 million mu of food grain is still unfinished; some paddies are sprouting; sweet potatoes are rotting with mildew; and only half of the 9 million mu or so cotton have been picked, and the damage in the cotton fields is enormous. Moreover, only 11.6 million of fall-sowing crops have been planted, or 27 percent of the planned target. This is the lowest figure in the past 5 years.

The circular urges all localities to do the following:

1. Dig more ditches to drain the excessive water.
2. Do everything possible to minimize losses by reaping the already ripened food grain and cotton.
3. Race against time to plant.
4. Send cadres to work at the grassroot level, putting rush reaping and planting ahead of all other matters that can be handled later.

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CSO: 4007/73

JIANGSU

BRIEFS

JIANGSU ARTIFICIAL CRAB BREEDING--Nanjing, 14 Oct (XINHUA)--Jiangsu province, China's leading crab breeding center, has raised more crabs this year than any of the past 5 years, according to the provincial aquatic products bureau. The provincial government spent 1 million yuan last year building artificial crab-breeding farms in eight coastal countries. As a result, they bred 120 million crabs this year--80 percent of the total bred artificially in the country. Most crabs were sold to other parts of China. In all, 3,000 rural households are breeding 22 million crabs in 150 hectares of ponds, said Director Zhou Songting. Earlier this year, the bureau opened training courses for 500 households to spread breeding techniques, Zhou said. Peasants usually catch up to 3.75 tons of crabs per hectare. Jiangsu exported 130 tons of crabs last year, mostly to Hong Kong and Japan. [Excerpts] [Beijing XINHUA in English 0848 GMT 14 Oct 85]

FISH-BREEDING AREAS DEVELOPED--Nanjing, 18 Oct (XINHUA)--Jiangsu province has developed 23,000 hectares of fish-breeding areas in its lakes and rivers, nearly double the figure for last year, according to a local official here today. The local people use screens to divide the water area into fishing grounds. This has ranked the province the first in the country in this method of fishing, he noted. China's Ministry of Agriculture, Animal Husbandry and Fisheries recently praised Jiangsu' development as inspiring for other parts of the country, he added. Jiangsu has a total of 1.28 million hectares of lakes and rivers. The province has put net and bamboo screens at the entries and outlets of lakes and rivers of about 10 hectares, separated those about 100 hectares into several fishing areas with the screens, and fenced off certain parts for fishing in larger lakes of about 10,000 hectares. This system makes possible artificial feeding of fish and raising better fish varieties, he said. The annual per hectare fish production of some of the fish-breeding areas reached 7,500 kg to 11,200 kg last year, he noted. [Text] [Beijing XINHUA in English 1436 GMT 18 Oct 85]

CSO: 4020/43

JIANGXI

CIRCULAR ON FALL CROP PROCUREMENT ISSUES

OW231205 Nanchang Jiangxi Provincial Service in Mandarin 1100 GMT 22 Oct 85

[Text] Our province has obtained a bumper harvest of autumn grain and oil-bearing crops this year. Recently the provincial people's government issued a circular calling on all localities to pay close attention to the purchase of these autumn crops. It called on the localities to make sure the state gets (?its proportionate share) of the grain and oil-bearing crops, to meet peasant demands for the sale of their crops, to promote commodity production, and to improve market supply.

According to the provincial people's government circular, those prefectures and cities that have reaped a good grain harvest this year should strive to purchase as much surplus grain as possible on the basis of [words indistinct]. As for grain offered for sale by peasants in addition to what the purchase contract calls for, grain departments should make unlimited purchase of such surplus grain at the going market price. It is necessary to make sure the oil and fat purchase target for the whole province is met and to make as much additional purchase as possible. Before the state purchase plan for oil and fat is fulfilled, no department, unit, or individual is permitted to make a purchase.

Banks should extend loans under a special account to guarantee that funds are available for the purchase of grain and oil-bearing crops under a purchase contract or for additional purchases. Peasants should be paid fully for the sale of their crops after deduction for agricultural tax. No department, unit, or individual should make any unauthorized deductions from such payments. It is also impermissible to make a deduction in disguise by writing a check for an account transfer through a credit cooperative.

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CSO: 4007/73

JIANGXI

JIANGXI RESULTS IN FIGHTING SOIL EROSION NOTED

OW071243 Beijing XINHUA in English 1038 GMT 7 Nov 85

/Text/ Nanchang, 7 Nov (XINHUA)--Jiangxi Province has achieved initial successes in the fight against water loss and soil erosion, thanks to government aid and the contract system.

Since 1980, the province has brought under control over 600,000 hectares of sandy land and barren hills which had been severely threatened by soil erosion, according to the provincial water conservancy department.

Jiangxi is a major grain-producing center in China and also one of the areas suffering the most serious soil erosion. Eroded land amounts to 3.4 million hectares--roughly 20 percent of the province's land area.

The provincial government has provided 9 million yuan for erosion-control over the past 5 years, the official said.

From 1986, the provincial government plans to bring under control soil erosion over 113,000 hectares annually and quadruple funds for this purpose to 7.2 million yuan a year.

In the fight against soil erosion, rural households are aided by local governments with techniques and in supplies of saplings of drought-resistant trees.

Now, most local peasants have signed contracts with a term of at least 15 years with villages or townships for land protection tasks.

Under the contracts, peasants enjoy the economic returns from the crops grown on the plots they undertake to improve. Contractors also receive 225 yuan in subsidies for controlling 1 hectare of land.

The projects have not only helped restore the ecological balance, but also increase grain output and brought in more income for the peasants.

The official cited Longkou township in Xingguo county as a pacesetter in the provincewide drive to halt soil erosion.

Five years of effort have raised the township's green cover from 10 percent to 30 percent. As a result, grain production reached 5,500 tons last year--a jump of 66 percent from 1979.

JIANGXI

BRIEFS

SUMMER GRAIN PURCHASE--Nanchang, 17 Sep (XINHUA) -- By 15 September, Jiangxi Province has purchased and stored 2.742 billion jin of summer grain, exceeding the target by 0.8 percent. [Summary] [Beijing XINHUA Domestic Service in Chinese 0808 GMT 17 Sep 85 OW]

STATE FARMS--The total industrial and agricultural output value of state farms in Jiangxi Province ranks seventh among the 29 provinces, municipalities, and autonomous regions, while the total industrial output value ranks fifth, and the value of export commodities fourth. In recent years, over 700 farm-run industrial enterprises and some 740 commercial stores have been established. The total industrial output value of state farms reached 240 million yuan in the first half of this year, an increase of 47.38 percent over same period of 1984. [Summary] [Nanchang Jiangxi Provincial Service in Mandarin 1100 GMT 25 Sep 85 OW]

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CSO: 4007/69

JILIN

FARMERS STUDY AGRICULTURAL SCIENCES

OW251908 Beijing XINHUA in English 1446 GMT 25 Oct 85

[Text] Changchun, October 25 (XINHUA)--More than four million peasants in Jilin Province have taken courses in popular agricultural sciences since 1983, a local official here said.

This is the equivalent of one trained peasant for every rural household in this northeastern province.

To improve farming methods and help peasants prosper faster, provincial authorities have formed a science and technology promotion network, covering every county, township and village, with the help of 100,000 agricultural specialists and skilled farmers.

In addition, 900 counties and towns have set up their own associations to promote new technology, and the local media is also being used to spread knowledge about agricultural sciences.

Subjects taken by the peasant students include modern sowing and harvesting methods and courses on new farm machines.

Lishu County has saved 300,000 yuan over the past two years through the use of new sapling-transplantation methods by local peasants.

And modern technology also helped Fuyu and Huaide counties to double their grain output, and Longjing County to reap 1,850 tons more rice over the past two years.

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CSO: 4020/63

SHAANXI

NEW METHOD HALTS SOIL EROSION ON LOESS HIGHLANDS

OW041138 Beijing XINHUA in English 0752 GMT 4 Nov 85

/Text/ Xian, 4 Nov (XINHUA)--Mizhi county in China's Shaanxi province has become a national pacesetter in controlling soil erosion on the loess highlands by applying a new method--intensive farming plus tree planting and livestock breeding.

The Yellow River washes away 1.6 billion tons of silt annually from the 530,000 square km highlands in dry, economically-underdeveloped Northwest China.

Using this method, a UN-aided pilot loess highlands control center here has helped local peasants bring under control water loss and soil erosion in a 108 square km gully since it was launched by the Provincial Academy of Agricultural Sciences in 1979.

Intensive farming means, center Director Zhu Xiangsan explained, spreading the use of fine crop strains, rational close planting and increased application of fertilizers; the aim is to help peasants raise per-unit output and therefore enable them to produce a surplus over and above the amount needed to feed themselves, he added.

Peasants have been advised to plant trees and grass on the sloping land unsuitable for growing crops. This has reduced water loss and soil erosion by 80 percent, with the gully's green cover rising from 10 percent to 60 percent, Zhu said.

Moreover, local peasants have promoted animal husbandry by introducing fine species from elsewhere in China and from abroad. Increased earnings from livestock breeding makes it possible for peasants to invest more in crop cultivation, Zhu noted.

"In this way, crop cultivation spurs animal husbandry, and the latter will, in return, promote the former," he said, adding that the new method combines the advantages of water-conservancy projects and biological control measures.

Chinese Communist Party General Secretary Hu Yaobang has repeatedly called on people in Northwest China to achieve prosperity as soon as possible by planting trees and grass to develop animal husbandry.

Zhu described the new method as a specific step to carry out Hu's call, since it is effective, beneficial to peasants and economical.

The state has spent 80,000 yuan on the gully. But building a dam would have cost much more than that and even 1 million yuan, he said.

After inspecting the gully in October, officials of UN organizations in Beijing agreed that the method is applicable to the control of water erosion on the whole of the loess highlands.

A center will be set up soon in Mizhi county to spread the method to other places on the highlands.

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CSO: 4020/76

SHAANXI

BRIEFS

PEANUT OUTPUT--According to revelant sectors, this has been a bumper year for peanuts throughout China. Based on preliminary statistics, the area sown to peanuts in Shaanxi is 750,000 mu, and it is estimated that total output could be 230 million jin. In Yanchuan county 20,000 mu have been sown to peanuts (of which 15,000 mu are covered with plastic films) and it is estimated that the yield could be 9 million jin of peanuts. [Excerpt] [Beijing ZHONGGUO XIANGZHENQIYE BAO in Chinese 21 Sep 85 p 2]

SHAANXI AFFORESTATION PLAN--Shaanxi Province afforested a toatl of 5.71 million mu of trees and planted 354,000 mu of seedlings in the first half of this year, thus prefulfilling the annual plan. Most striking of all is that Yanan and Yulin prefectures planted a total of 2.189 million mu of trees, or 38 percent of those planted in the province. [Summary] [Beijing XINHUA Domestic Service in Chinese 0042 GMT 29 Sep 85]

CSO: 4007/51

SHANDONG

BRIEFS

TRADE TALKS MEETING--The Shandong Provincial grain and edible oil trade talks meeting was held in Jinan from 9 to 11 October. Attending the meeting were representatives of grain departments and trading companies of 15 provinces, cities, and autonomous regions and 14 prefectures and cities in Shandong Province. The transaction volume amounted to some 400 million yuan, an increase of more than 2 times over last year's trade talks meeting.

[Summary] [Jinan Shandong Provincial Service in Mandarin 2300 GMT 13 Oct 85 SK]

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CSO: 4007/73

SHANXI

WAYS OF IMPROVING GRAIN CONVERSION, REDUCING GLUT DISCUSSED

Beijing NONGYE JISHU JINGJI [ECONOMICS FOR AGRICULTURAL TECHNOLOGY] in Chinese
No 4, Apr 85 pp 20-22

[Article by Huang Jiasheng [7806 1367 5116]: "The Economic Results of Grain Conversion"]

[Text] I. New Problems That Have Occurred on the Grain Front

Originally a grain-deficient province, Shanxi, since the implementation of the household responsibility system in the countryside, has enjoyed a succession of bumper harvests and now boasts a surplus, in contrast to the shortages which the province long suffered. Prior to 1978, approximately 1 billion jin of grain were stockpiled throughout the province, but by 1983 this total rose to 2.6 billion, and in 1984 it rose to 3.4 billion. And with the addition of military grain stockpiles, stores of negotiated-price grain and grain stored for brigades, reasonable storage capacity has been exceeded by 42.68 percent.

When grain is stored for a long time, it changes color and flavor, its use value gradually declines, and it even deteriorates, mildews and spoils, causing losses. In Yuncheng Prefecture, the storage capacity of state granaries totals 586 million jin. Before grain was even purchased in 1984, existing stockpiles totaled 640 million jin, exceeding capacity by 8.8 percent. When wheat purchases commenced, the grain system initiated a massive effort to tap potential, take over other storage facilities, lease buildings from the people, pile grain up in the open and "have the people store grain for the state" and thus was able to procure more than 1 billion jin. Yet some storage facilities were poor in quality, and due to the unusually heavy rainfall during the summer, more than 10 storehouses have developed leaks or collapsed. In Xia County in that prefecture, state granaries have held 2 million jin of corn for more than 5 years, all of which has been ruined due to insect damage and lost all use value. It is predicted that grain procurement levels will be even higher in 1985 and that the storage problem will be even more serious.

The more grain stored by food departments, the greater the burden borne by the state. In Yanbei Prefecture, 540 million jin of grain were purchased in 1983, the state paid out 17.85 million yuan in surcharge subsidies, the average

annual storage volume was 420 million jin, storage subsidies totaled 5.95 million, and thus these two subsidies totaled 23.80 million yuan in that year. In 1984, the state purchased 650 million jin of grain, paid out 30.27 million yuan in surcharge subsidies, stored an annual average of 700 million jin, paid out 7.50 million yuan in storage subsidies, and thus had a total outlay of 37.77 million yuan for these two subsidies, an increase of 58.69 percent over the previous year. And if we include interest on grain loans and damage incurred in storage, the economic losses were even greater. Yet what appears to be a glut of grain is merely a relative and temporary phenomenon. Rather, it should be said that our grain supply is by no means abundant and for the moment seems excessive only because of weaknesses in our grain conversion work. In terms of per-capita grain shares, the world average has reached 800 jin, the average in the Soviet Union is 1,800 jin, in the United States it is 3,000 jin, but in Shanxi it is only 600-plus jin, which is far below advanced levels. Our current glut in grain has been caused by systemic malfunction and the weakness of the grain conversion mechanism.

II. An Appraisal of the Economic Results of Grain Conversion

How can grain gluts be eliminated? One way is to sell the excess to other areas. A second way is to convert the excess locally. Facts prove that the first way will not work in Shanxi. This province is the home of coal, and overstocked coal now totals 30 million tons, equivalent to a loss in sales revenue of 810 million yuan. Each year, 700,000-plus tons of coal that cannot be shipped out are blown away by the wind, washed away by rain or burned up through spontaneous combustion, causing a total loss of 18.90 million yuan. To ensure that coal can be shipped out of the province, railroad departments have allotted very little planned transport capacity to grain, so shipping would pose a difficulty if we wanted to sell our grain outside the province. In 1983, Yanbei Prefecture signed contracts to send grain to Beijing, Tianjin, Hunan and Guangxi, but 18.30 million tons of grain could not be shipped due to a shortage of rail cars, and 12 contracts could not be honored.

Although selling grain outside the province is not feasible for Shanxi, the province does enjoy great potential in conversion. According to data from Shanyin County, converting grain into nonstaples, meat, eggs and milk not only can improve people's diets, it can also expand commercial production, increase output value, and improve economic results. The following tables show that an additional 0.081 yuan is earned for each jin of grain converted to nonstaples, 0.195 yuan for each jin converted to meat, 0.182 yuan for each jin converted to eggs, and 0.283 yuan for each jin converted to milk.

The Economic Results of Grain Conversion

1. Grain-Nonstaple Conversion

<u>Item</u>	<u>Amount of grain used (10,000 jin)</u>	<u>Cost (10,000 yuan)</u>	<u>Gross income (10,000 yuan)</u>	<u>Net income (10,000 yuan)</u>	<u>Increase in value per jin (yuan)</u>
Flour milling	200	53.3	66.6	13.30	0.066
Brewing	10	1.83	2.2	0.37	0.037
Beancurd processing	90	30.0	40.5	10.50	0.117
Total	300	85.13	109.3	24.17	0.081

2. Grain-Meat Conversion

<u>Item</u>	<u>Amount of grain used (10,000 jin)</u>	<u>Cost (10,000 yuan)</u>	<u>Gross income (10,000 yuan)</u>	<u>Net income (10,000 yuan)</u>	<u>Increase in value per jin (yuan)</u>
Pig raising	144	22.43	50.45	28.02	0.195

3. Grain-Egg Conversion

<u>Item</u>	<u>Amount of grain used (10,000 jin)</u>	<u>Cost (10,000 yuan)</u>	<u>Gross income (10,000 yuan)</u>	<u>Net income (10,000 yuan)</u>	<u>Increase in value per jin (yuan)</u>
Laying-hen raising	56,466	12,138	22,388	10,250	0.182

4. Grain-Milk Conversion

<u>Item</u>	<u>Amount of grain used (10,000 jin)</u>	<u>Cost (10,000 yuan)</u>	<u>Gross income (10,000 yuan)</u>	<u>Net income (10,000 yuan)</u>	<u>Increase in value per jin (yuan)</u>
Milk	830	180.11	414.9	234.79	0.283

Note: Costs in the above tables do not include labor.

If we were to convert all of the 2.56 billion jin of grain that Shanxi holds in excess of total provincial storage capacity through the crude processing of the traditional "five workshops" and compute only the one-time

increase in value thereby obtained, the total value added would be 207.4 million yuan. But actually, all of the nonstaples produced by the "five workshops" in the countryside are used as animal feed (mostly for pigs and chickens). Therefore, at the lowest value-added rate listed above (0.18 yuan per jin), we would directly increase income by 460.8 million yuan if all the province's excess grain were converted. And if we also converted the 254 million jin of grain that are lost due to damage, our income would rise by a total of 714.8 million yuan, which is equivalent to 476.5 million jin of grain (at 0.15 yuan per jin), or 28.03 percent of Shanxi's total grain output in 1984.

In 1984, Shanxi's grain output (17.0 billion jin) constituted 2.125 percent of the national total (800 billion jin). Applying the above rates nationally, then it is possible that throughout the country there is a grain surplus of 120.47 billion jin. If not converted, this surplus would lead to an economic loss of 8.031 billion yuan and, if converted, would earn an additional 21.685 billion yuan. Adding these two amounts, it appears that the conversion of all the surplus grain in our country would increase income by 29.716 billion yuan, which is equivalent to 198.11 billion jin of grain, or 11.65-fold the level of Shanxi's total output.

Grain conversion is an issue that arises only after basic food and clothing problems are resolved. In dietary development, we change from coarse to fine grains; from inferior, traditional foods to those that are of higher quality and are more modern; and from consumption primarily of grain to a mixture of meat and grain. This process has already occurred in developed countries and has commenced in China. The above calculations are based only on traditional rural technical levels; if we use modern, new technology and attain a greater level of refinement in food processing, the benefits derived from grain conversion will be even greater.

III. We Must Establish an Intelligent Strategy so as To Achieve the Best Economic Results

For various reasons, the economic results of some enterprises' grain conversion are not very good, and people are not very interested in grain conversion. Thus it is apparent that the key to grain conversion lies in economic results. How can we improve those results? We must change traditional conversion methods and establish an intelligent conversion strategy.

1. We must introduce new technology, and food processing must advance from "crude" to "fine." The rural food processing industry has just started, and while it is widely distributed, its techniques are backward, and its products lack variety, are outmoded, and are inferior in quality. For example, the rural cookie manufacturing industry mainly uses flour, saccharin and soda, and produces goods that are hard and rough. The bread and pastries that are similarly produced are crudely processed and may truly be said to be "cheap." These foods were hot sellers in the 1950s, but in the 1980s they are no longer well received. Thus we must change strategy, introduce new skilled personnel and advanced technology and equipment as rapidly as possible, and make a great effort to initiate refined processing and to produce a greater variety of new foods that are nutritious, beautiful, tasty and excellent in quality.

Experience from across the country proves that economic results are better when processing is more refined. It is apparent that the profits on high-grade foodstuffs amount to about 50 percent of their selling price. Thus the value added per jin of grain is not merely a few fen or 10-odd fen but may reach several tens of fen or even more than a yuan. And the greater the economic results, the more enthusiastic people will be for food processing.

2. We must stress science and tap the potential for returns on feed. The backwardness of science, technology and the feed industry in most areas of China has led to low returns on feed. For pig raising, the ratio between feed expenditure and meat production is about 4:1, and for chicken raising, the ratio between feed expenditure and egg production is about 3.5:1. Indeed, there are even losses in both operations, which dampens people's enthusiasm for animal husbandry. In recent years, the feed/meat ratio for pigs has been 3:1 while the feed/egg ratio for chickens has been 2:1 in developed countries. Compared to these rates, we are very far behind. Feed expenses account for about 70 percent of our total costs in animal husbandry, and grain comprises about 70 percent of all feed. Thus we must as rapidly as possible improve technological mixes in our animal husbandry, transform this labor- and fund-intensive industry into one that is technology- and know-how-intensive, alter the traditional practice of relying entirely on grain for animal and fowl feed, adopt new technological fruits, disseminate scientific feed formulas in accordance with local conditions, increase returns on feed additives, spread advanced scientific conversion methods and realize the potential of grain conversion.

3. We must initiate multiple processing and recycling so as to achieve the best results in conversion. Scientific experimentation and experience around the country prove that the direct use of large quantities of grain to feed animals and poultry usually yields poor economic results and leads to bad management and even to losses. We should replace these practices with multiple processing and recycling and use primary products as foodstuffs or raw materials for industry, and byproducts or leftovers as feed for animal and poultry. In this fashion, we can improve economic results. Historically, Chinese peasants have relied on the traditional and customary practice of barnyard feeding for animal and poultry raising and have obtained much greater economic results thereby than by the direct use of grain as feed. Thus we must encourage peasants to initiate various types of food processing operations and to integrate these with animal husbandry so that each operation complements the other, so that value is increased through many steps and so that grain conversion achieves optimum economic results.

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CSO: 4007/359

SICHUAN

PROVINCE EXPERIMENTS WITH ECOLOGICAL FARM SYSTEM

OW021438 Beijing XINHUA in English 1110 GMT 2 Nov 85

[Text] Chongqing, November 2 (XINHUA)--A farming system based on modern ecological science is being implemented on a trial basis in Chongqing, Sichuan Province.

The system was devised by Professor Ye Qianji of the South-West China Agricultural College with help from city authorities, who provided 33 square kilometers of barren hills and more than 20,000 yuan for the experiment.

Forty-eight peasant families taking part in the experiment are expected to earn an average of 490 yuan per person this year--compared with 297 yuan in 1983.

Guided by Professor Ye and other agricultural scientists, these families have grown trees and imported grazing grass on 8.8 hectares of contracted hill-sides, raised 105 cattle and planted 43 fruit orchards in an integrated farming effort over the past two years.

Xie Baijin and his family began processing 50,000 kilograms of grain a year in 1983. He uses wheat bran and rice husks to produce feed for pigs, and pigs' manure to produce methane for fuel and to fertilize grapevines.

As a result, his pigs have grown quicker than his neighbor's, his 600-cubic-meter biogas pit has saved him more than 2,000 kilograms of coal a year, and his vines are expected to yield 1,000 kilograms of grapes this year, compared with 750 kilograms in 1984.

Xie said: "My family of five is expected to earn more than 10,000 yuan this year--almost double the 1983 figure."

A city official supervising the project said the amount of tree cover over the experimental area was expected to increase from the present 1.3 percent to 24.6 percent by the end of this century, in addition to the overall economic benefits.

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CSO: 4020/63

XINJIANG

BRIEFS

COLD SPRINGS FOUND--Urumqi, October 10 (XINHUA)--More than 1,000 cold springs have been found in the eastern part of the Kunlun mountains, scientists of a Sino-U.S. joint mountaineering team reported today. The springs contain 0.1-2 degree centigrade water and have a total flow capacity of 11 cubic meters per second. Over one ton of water flows out from the biggest spring per second. This is a rare combination of temperature and flow capacity, specialists say. The mineral springs cover an area of 4,200 sq km and are located 4,300 meters above sea level. The mineral water is of high quality and contains carbonic acid. The scientists reported this from the mudztaga camp. The Sino-U.S. joint mountaineering team is to climb Mt. Mudztaga in the eastern part of the Kunlun mountains in the Xinjiang Uygur Autonomous Region. [Text] [Beijing XINHUA in English 1030 GMT 10 Oct 85 OW]

XINJIANG AFFORESTATION FEATS--In the last 30 years, Xinjiang Uygur Autonomous Region has vigorously planted trees and grass, yielding an afforestation area of 4.7 million mu, which, in turn, protects some 25 million mu of cultivated land. This undoubtedly contributes to the region's bumper harvests in agriculture. Currently, the region has forest belts covering 2.17 million mu, and protecting 60 percent of irrigated areas. In addition, shrubs, grass, and trees were planted extensively in the desert areas outside the oases in order to counter the sand and other elements. [Summary] [Beijing Domestic Service in Mandarin 1600 GMT 13 Sep 85]

CSO: 4007/51

YUNNAN

SMALL ETHNIC GROUP IN PROVINCE PROSPERS

OW011237 Beijing XINHUA in English 1134 GMT 1 Nov 85

[Text] Kunming, November 1 (XINHUA)--The average income among a small ethnic minority in Yunnan Province is likely to increase by 80 yuan per person this year from 360 yuan in 1984, according to provincial authorities.

Agricultural output from the 13,000-member Jino etynic group tripled between 1979 and 1984, and grain yield increased from an average of 300 to 550 kilograms per person.

Before 1979, many Jino people suffered malnutrition. Now, brick and tile houses are being built, and many families have bought tape recorders, TV sets and washing machines.

Of the 45 villages in Jino mountains, 35 were using motor vehicles and 18 were supplied with electricity at the end of last year.

More than 90 percent of children are attending school and 31 students are studying in colleges.

Jino people, who used to farm by the slash-and-burn method, were urged to abandon their backward cultivation methods by Premier Zhao Ziyang during a visit there in 1980. A development project was started the following year.

Technicians from several scientific research institutes drew up zones for crops in the mountains, where two-thirds of Jino people live, and planted 60 hectares of fields as examples of what could be done.

As a result, forest burning ceased, and rubber and tea cultivation has developed.

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CSO: 4020/63

ZHEJIANG

PEASANTS GET NEW, IMPROVED HOMES

OW300410 Beijing XINHUA in English 0245 GMT 30 Oct 85

[Text] Hangzhou, October 30 (XINHUA)--About half of the eight million rural households in Zhejiang Province have moved into new brick-built homes since 1979, according to the provincial construction department.

During that period, peasants have completed new housing with a total floor space of 250 million square meters, department official Yang Binhui said. Now, each rural resident occupies a floor space of 20 square meters--up 32 percent from 1978.

The rural housing boom followed the introduction in 1979 of the responsibility system, which links income with output. Each Zhejiang rural resident earned an average of 446 yuan last year, 2.7 times the 1978 figure.

"Peasants are aided by local governments and collectives with funds and supplies of corrugated iron, timber, cement and glass," Yang said. They own their houses according to government policy.

The quality of new houses has been improving during the construction boom, with most units having brick or stone walls, tile roofs and glass windows. Prefabricated concrete parts, and terrazzo and wooden floors are also in use.

The new materials are in sharp contrast with the adobe walls, thatched roofs and paper-covered windows once common in the countryside.

In a further change, some village-like houses have courtyards with flowers, fruit trees, fountains and rockeries. Dwellings of three to five stories, equipped with air-conditioners and elevators, have been built in more prosperous counties.

"Meanwhile, large-scaled construction of public facilities is under way in rural areas," Yang said.

Thirty percent of Zhejiang's 34 million rural inhabitants now have piped water, thanks to the completion of 15,000 waterworks since 1979. Electricity is available in 88 percent of the 141,000 villages, and 95 percent of rural townships have roads.

Yang said that at least half a million square meters of rural cinemas, theaters, cultural centers and clinics have been built each year since 1979.

Drafting of rural development plans has been completed for 95 percent of the 1,500 towns and 97 percent of all villages, he added.

The plans mandate the scale of rural construction, and promote the rational use of existing facilities and the construction of public works. New villages and towns built according to the plans occupy an average of 15 percent less land than older ones.

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CSO: 4020/61

ZHEJIANG

DEVELOPMENT OF FEED INDUSTRY IN ZHEJIANG EXAMINED

Hunan JINGJI DILI [ECONOMIC GEOGRAPHY] in Chinese No 3, Aug 85
pp 207-210

[Article by Huang Yong [7806 0516] of the Economic Research Institute, Zhejiang Provincial Planning Commission: "Problems Concerning the Development of the Feed Industry in Zhejiang Province"]

[Text] The feed industry is still a weak link in PRC industry at the present time and is ill-adapted for the rapid expansion of commodity production in the rural areas; a task of top priority is to devote major efforts to developing it. This article takes a close look at three aspects of the feed industry development problem in Zhejiang Province.

I. Analysis of Raw Material Requirement

To analyze the raw material requirement it is first necessary to estimate a target for feed industry development. In accordance with the principle of developing the feed and livestock-breeding industries in synchrony and the principle of linking up the variety mix of compound and mixed feeds with the variety mix within the animal husbandry and fishery industries, we made a preliminary estimate of the Zhejiang feed industry development targets for 1990 based on the livestock and aquatic products Seventh 5-Year Plan, and for the year 2000 based on the foodstuff component design for the end of the century (see Table 1).

Table 1. Estimates of Zhejiang Province Compound and Mixed Feed Requirements for 1990 and 2000

Unit: 100 million jin

	1990 Requirements based on Seventh 5-Year Plan for livestock industry, aquatic products			Requirements for year 2000 based on end-of-century foodstuff component plan		
	Program target	Meats (eggs, milk) ratio	Feed requirements	Program target	Meats (eggs, milk) ratio	Feed requirements
Pork, beef, mutton	16.4	3.5 : 1	57.4	21	3 : 1	63
Poultry	3.6	3 : 1	10.8	6	2 : 1	12
Eggs	5.5	3 : 1	16.5	12	2 : 1	24
Fresh milk	3.21	0.33 : 1	1.1	20	0.3 : 1	6
Freshwater fish	3.5	1.2 : 1	4.2	7	1 : 1	7
Total	32.21	---	90	66	---	112

The most prominent problem in realizing the estimated development target, with respect to the balance of feed resources, is the severe shortage of protein feeds; the same situation holds for the country as a whole. An estimate of several of the staple protein feed resources currently utilized in Zhejiang Province is presented in Table 2.

Table 2. Estimates of Staple Protein Feed Resources in Zhejiang Province

Unit: 100 million jin		
	Amount publicly owned: 1983 revised figures	Amount publicly owned: 1990 estimates
Rapeseed cake	3.16	3.85
Cottonseed cake	1.87	1.94
Dried silkworm	0.31	0.39
Fish meal	1.21	1.77
Blood, bone, flesh meal	0.25	0.5

The protein feed resources listed in Table 2 have been converted into amounts of crude protein in Table 3.

Table 3. Conversion Table for Amounts of Crude Protein in Staple Protein Feed Resources in Zhejiang Province*

Unit: 10,000 jin			
	Crude protein percentage	Amount of crude protein, 1983	Amount of crude protein, 1990
Rapeseed cake	37	11,692	14,245
Cottonseed cake	37	6,919	7,178
Dried silkworm chrysalises	60	1,860	2,340
Fish meal	50	6,050	8,850
Blood, bone, flesh meal	80	2,000	4,000
Total	---	28,521	36,613

*Crude protein percentages supplied by feed corporations.

If we assume all of the protein feed resources mentioned above are used for compound and mixed feeds, and if the protein feed in those compound and mixed

feeds provide 6 to 8 percent crude protein, 3.5 to 4.8 billion jin of compound and mixed feeds could have been produced in 1983, and 4.5 to 6.1 billion jin could be produced in 1990. The calculations show that, with respect to resource quantities available, in the near future the aforementioned protein feeds will still be able to satisfy compound and mixed feed production requirements, but it is obvious that by 1990 there will be an imbalance to the extent of a 3 billion jin shortage of protein sources for compound and mixed feeds. Because we will not be able to increase the protein feed resources mentioned above very much, the shortage will be even greater by the year 2000, and since those resources cannot be used entirely in the feed industry, it will be even more difficult to balance.

The energy feed balance does not present a problem in terms of overall quantity. Planned targets for gross output of grain in Zhejiang Province are 36 billion jin for 1990 and 40 billion jin for the year 2000. There will be an increase in the amount of grain per capita, but the average amount consumed as food and that utilized as seed grain both will tend to drop; when the time comes we need only come up with 5 billion and 6 billion jin of feed grain, respectively, to be able to meet the requirements and this is completely within our means to accomplish. There is a particular contradiction in variety mix when it comes to corn, "the king of feeds;" the yearly output dropped approximately from 590 million jin in 1978 to 270 million jin in 1983, and the shortage has become greater and greater. Barley acreage has increased at a rate of 11.2 to 18.13 percent since 1979; output amounted to 1.53 billion jin in 1983, which helped the situation a bit, but there has been more tension between supply and demand in the wake of the upsurge of the beer industry.

There is still a basic gap in the production of feed additives in Zhejiang Province at the present time.

In view of the above-mentioned facts, the following measures should be employed to develop the feed industry in Zhejiang:

1. In the crop-growing industry we should progressively break from the cereal grain-cash crop mix and develop in the direction of a cereal grain-feed-cash crop mix. Besides increasing the growing of feed crops such as corn and Chinese milk vetch (*Austragalus sinicus*), we could also emphasize the development of woody plant feeds in places where the combination of moisture, temperature and illumination conditions are favorable.
2. Provide raw materials for the feed industry through the breeding industry: for example, popularize the cultivation of earthworms; increase the breeding of low-order shellfish, aquatic plants and plankton in shallow waters along the coast; carry on the joint raising of fish and ducks, and chickens and hogs, rely on the food chain, develop exploitation on many levels, and raise the protein-utilization coefficient.
3. Make the most of currently available protein feeds such as earthworms, rapweed cakes, cottonseed cakes and tankage, including blood, bone and viscera from slaughterhouses; all these could be fully utilized.

4. Redistribute through exchange channels. For example, exchange paddy from Zhejiang for feeds from outside the province, such as corn; utilize coastal ports to export processed agricultural and livestock products and receive in exchange feed additives, corn and other miscellaneous grains at cheaper than domestic prices.

5. Utilize the methods of industry to obtain industrial feed resources. For example, develop the fishmeal-processing industry along the coast; set up industries to grind leaves, such as pine needles, in the forest regions; employ industrial fermentation methods in the cities to produce unicellular protein.

II. Selection of a Development Model

Of the feed industry development models of the various countries of the world there is the U.S. model, characterized by raw material self-sufficiency, scattered factories, moderate scale and a small feed-supply radius; the Japanese model, characterized by a fundamental dependence on importing raw materials, feed factories concentrated in coastal port cities and relatively large scale; the Soviet model, characterized by being partially self-sufficient in raw materials and having to import a portion of them, and in addition to large-scale feed plants approximately one-third of output is accounted for by mid-sized and small-scale feed plants of the collective farms. We can draw on the experiences of these three models, yet the model which Zhejiang actually chooses also must proceed from the reality of the situation in the province and is mainly dependent upon such factors as raw material sources and service targets. Appropriate measures must be adopted to counter the feed resource situation in Zhejiang; except for the continuing need to import corn and some additives from outside the province and from abroad, it is basically self-sufficient in other raw materials, but most of them are scattered throughout the rural areas. The breeding industry also is primarily scattered among the myriad rural households; although the breeding specialized households have developed rapidly in recent years, they cannot compare with the specialized pasturelands abroad in scale and there is a lack of stability. Accordingly, numerous small-scale feed-processing plants situated throughout the vast rural areas should be selected as a development model for the feed industry in Zhejiang Province. It is most appropriate for this task to be undertaken by the rural and small town enterprises (which include household industries and peasant joint ventures); it would solve the problem of the state assuming responsibility for the feed industry with insufficient financial resources and it would give practical significance to promoting on-the-spot grain conversion, and restructuring the agricultural planting structure and the rural industrial structure. We must emphasize mid-sized and small state-run feed plants at the county level, whose central task is to produce feed concentrates with a relatively high protein content to supply the feed plants in the rural areas so they can process compound and mixed feeds; they may also produce partial and complete compound feeds. Large-sized enterprises could be set up in several of the relatively large cities, which could supply high-quality compound feeds for the breeding industry in the suburbs, on the one hand, and, on the other hand, could produce feed additives and premixed feeds to be transported to the feed-processing plants at the county level and below.

To summarize the aforementioned feed industry development model for Zhejiang, we should make the state-run enterprises the backbone, make the rural and small town enterprises the main body, and form a pagoda-shaped feed industry system with different administrative levels, varying quality and different scales. The key to forming this development model lies in setting up a management system which is adapted to it. The feed industry in place today is divided among the grain, aquatic products, rural and small town, and supply and marketing departments; even the grain system is divided into feed plants managed by grain corporations and rice factory feed shops managed by the grain bureau. A management system with many heads does not lend itself to unified planning and a rational division of labor. The problem with the feed industry situation in Zhejiang is that the state-operated feed industry is not mutually coordinated with development of the rural and small town feed industry. Although the state-operated feed industry has a certain processing capacity, it has insufficient storage capacity so there is no way to go full speed ahead with processing; furthermore, the internal structure is not rational and the feed resource industries are fundamentally lacking in such things as feed additives. Because there is not a complete array of feed resource varieties and since feed additives and protein feed resources are lacking for the rural and small town feed industry, it is hard to get started and regional development is uneven. For this reason, it is imperative that we restructure the management system in place today. We can consider the feed corporations at all levels as coming about independently from within the grain bureaus and taking shape as independent cost accounting units. It is a management model where economic entities assume sole responsibility for their own profits or losses and which combines centralized and local control, where centralized control is primary; perhaps there will be provincial feed corporations with departments which are formally established and abolished, and gradually we may set up industrial economic entities, form joint feed enterprises or a rather loose-knit specialized cooperative network, and set up a comparatively independent specialized producing industry department for the feed industry.

III. A Tentative Plan for Time and Space Distribution

Any industry has specific time and space distribution requirements. Time and space distribution refers to sequential development through time, on the one hand, and regional distribution, on the other. In that case, what kind of time and space distribution setup should the Zhejiang feed industry have?

An inspection of the chronology of feed industry development in Zhejiang shows it currently to be in the startup stage. Given the present raw materials structure, facilities condition, manpower and material resources it is still difficult to produce high-level compound feeds, and, therefore, since the rural and small town enterprises are making do with whatever is available, this is precisely an opportune moment to make an all-out effort to forge ahead; but development of the rural and small town feed industry currently is lagging behind the state-run feed industry. The state-operated feed plants took the lead at the end of the 1970's and by the end of 1983 they had developed the capacity for a single shift to produce 230,000 tons per year, while at the end of the same year there were only 60-odd rural and small town compound and mixed feed processing plants in the whole province, and they were at the startup stage.

The processing capacity of the state-run plants is not linked up with resources at the present time; for example, all of the 145 feed plants which were slated for construction have been built and double-shift production capacity amounts to 1.8 billion jin, while the state currently only takes control of about 700 million jin of feed grain per year; 3.0 billion jin is still in the hands of the peasants. For this reason, a task of top priority is to devote major efforts to developing the rural and small town feed industry, to restructure gradually the product orientation of the state-run feed industry and to maintain the coordinated and synchronous development of the state-run and rural and small town feed industries. In areas where the rural and small town feed industry has been set up, the state-run plants should progressively change to producing enriched feeds and premixed feeds. At the same time, a complete set of feed additives must be produced and feed resource industries must be strengthened; manufacture of feed machinery and feed research must precede this change.

Furthermore, an investigation of the regional distribution of the feed industry in Zhejiang currently points up two major problems. One problem is that the overall distribution still lacks balance (see Table 4). Production capacity of the state-run feed plants in Wenzhou and Huzhou cities, as a proportion of the feed industry production capacity of the province as a whole, is very much lower than its proportion of livestock industry output value. Development of the rural and small town feed industry in the various localities is even more uneven; for example, the annual output of the rural and small town feed industry in Pujiang County, Jinhua Prefecture, already accounts for one-half of the total output for the county as a whole, while the rural and small town feed industries in many counties have not yet been able to get started. The second problem is that the variety mix of the feed industry in the various localities is not coordinated with the livestock and aquatic product variety structure. For example, Huzhou City, located in a network of rivers region, currently has only one factory to produce pellet feed for fish that has an annual production capacity of 5 million to 6 million jin, and still depends on outdated practices to supply 90 percent of the fish feed. Poultry feed supplies in Jinhua City frequently are interrupted and it is often out of stock.

Table 4. Comparison of Production Capacity of State-Run Feed Industry and Livestock Industry Output Value for Various Cities and Prefectures in Zhejiang Province, Expressed As Percentages*

	Province as a whole	Hangzhou City	Ningbo City	Wenzhou City	Shaoxing City	Jiaxing City
Percentage of feed production capacity	100	13.0	10.9	3.5	7.8	16.5
Percentage of livestock industry output value	100	13.5	9.8	10.2	10.5	12.7

	Huzhou City	Jinhua Prefecture	Lishui Prefecture	Taizhou Prefecture	Zhoushan Prefecture
Percentage of feed production capacity	3.9	27.4	2.6	12.2	2.2
Percentage of livestock industry output value	7.1	21.2	4.4	9.7	0.9

*Calculations based upon 1983 year-end statistical data.

To solve the aforementioned problems, the first thing we must do is unify planning based on the pattern of regional differences, and fix development directions for the feed industries in different regions. Specifically, we should pay attention to the following factors: first, there are consumption trends in the feed-processing industry, and it is necessary to maintain synchronous development with the livestock and aquatic product industries; we must pay attention to the mutual linking up of the variety structure. Second, raw materials for the feed resource industry are mercurial, so we must watch for the rational distribution of resources in the various areas. Third, the feed machinery industry should be situated in cities or towns with a definite capacity to manufacture machinery. Accordingly, the following plan has been drawn up for the development of the feed industry in the different regional types in Zhejiang:

1. Cities: As centers of the feed industry for the province as a whole, development is in the direction of basic feed industries, including feed resource industries which produce unicellular protein and other feed additives, blood and bone meal and premixed and enriched feeds, and industries which manufacture feed machinery. At the same time, the surrounding suburbs concentrate on developing the dairy cattle, poultry and fish feed-processing industries. We can consider utilizing foreign capital in Ningbo and Wenzhou cities, two port cities which have opened to the outside world, and introduce technology and equipment to set up large-scale modern feed industry enterprises.
2. Flatlands in the river network area: This includes the Hangjiahui, Ningshao and Wentai flatlands, which are the major grain, livestock and fishing districts in Zhejiang. Not only are there abundant resources for developing the feed industry, but the demand is great as well. It is an area we should concentrate on in developing the feed-processing industry; it has numerous varieties with the emphasis on hog, fish and poultry feed. Factory scale could appropriately be enlarged somewhat; we should set up specialized feed-processing enterprises in the areas where the breeding processes are relatively highly specialized, and we must engage in specialized production of fish feeds in particular.
3. Hill and basin areas: This chiefly refers to the Jinqu Basin and the hill and basin area of eastern Zhejiang. There are relatively large amounts of such commodities as hogs, poultry, cattle, sheep and rabbits in these areas and the variety mix should be coordinated with this in developing the feed industry. Jinhua City is a major dairy cattle base in this area of Zhejiang, development of milk goats has been rapid in Linhai County and Xinchang County is a key long-haired rabbit production area; the feed industry must be adapted to their development. In addition, the Jinqu Basin accounts for more than 40 percent of the hilly embankment reservoir area for the whole province, and is suitable for developing small-scale plants to process fish-feed pellets.
4. Mountainous regions: This includes the mountainous regions of southern Zhejiang and the hilly country in western Zhejiang. In the long term, the feed industry should base itself on utilizing coarse grains from the mountainous regions; it could also exchange with other regions for feed raw materials in short supply and produce hog, chicken and duck feed. Owing to the relatively

poor transport conditions and low breeding density, the factory scale should not be too large; it should be suitable for promoting movable processing units.

5. Seacoast and islands: In concentrating on development of the fishmeal-processing industry, we must pay attention to grouping it with aquatic product food canning enterprises; also we could utilize shells, such as oyster shells, to produce mineral additives, and establish a base for the Zhejiang feed resource industry. We must set up processing plants for the specialized production of feed for prawn and luofei [5012 7236] fish in the prawn and luofei fish breeding bases of the Zhoushan archipelago.

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CSO: 4007/461

ZHEJIANG

BRIEFS

CIRCULAR ON HARVEST STORAGE SPACE--The provincial government recently issued a circular, calling for urgent steps to resolve the shortage of storage space and do a good job in procuring autumn grain. The circular said: Grain in storages throughout the province has already reached an all-time high. In view of the anticipated bumper autumn harvests, we are facing a serious problem of shortage of space for storing grain. If no effective measures are taken, peasants in many localities will have difficulty selling grain. Therefore, the circular called on governments at various levels to pay close attention to resolving the space problem for autumn grain. Localities having the problem must do everything possible to ensure storage space by taking immediate action to lease tea farms, silk farms, public halls, or private housing to store the grain. Rice, corn, soybeans, and other grain crops specified as grain crops by the state must be purchased according to contract. Grain not covered by contract should also be purchased at set prices. State grain departments must also actively handle dried sweet potatoes. [Text] [Hangzhou Zhejiang Provincial Service in Mandarin 1000 GMT 21 Oct 85]

CSO: 4007/51

Plant Pathology

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TITLE: "Experimental Control of Bakanae Diseases of Rice Plants"

SOURCE: Tianjin ZHIWU BAOHU XUEBAO [ACTA PHYTOPHYLLACICA SINICA] in Chinese
No 2, Jun 85 pp 139-141

ABSTRACT: In recent years Bakanae disease has become a serious threat to paddy rice plants in Hanzhong Prefecture, Shaanxi Province. The pest-infested area was 162,000 mu in 1982 for the prefecture. In that year, the authors collected typical rice seeds in the major pest-infested area; washing and isolation of single spores were carried out in the determination of the pest bacteria. As a result, *Fusarium moniliforme* was detected in 91.27 percent of the pest-infested seeds; and *F. graminearum* and *F. equiseti* in 7.14 and 1.59 percent, respectively, of the pest-infested seeds. Through seed treatment experiments, it was discovered that chemicals "402", Duojunling [effective in acting against multiple bacterium species], and formalin are effective in suppressing the pest seedling rate to 0.04 to 0.39 percent, 0 to 0.38 percent, and 0 to 0.14 percent, respectively. In 1983, seed treatment with these chemicals was expanded to 285,000 mu of paddy fields following multiple plot experiments. Four tables list data showing the indoor isolation results of rice plants with different symptoms, determination results for rice seed treatment to control Bakanae disease, and comparisons of output results and difference significance in field experiments.

10424
CSO: 4011/39

Plant Pathology

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TITLE: "Preliminary Identification of Complex Infection of Wheat Yellow Leaf Virus (WYLV) and Barley Yellow Dwarf Virus (BYDV) on Wheat"

SOURCE: Tianjin ZHIWU BAOHU XUEBAO [ACTA PHYTOPHYLLACICA SINICA] in Chinese No 2, Jun 85 pp 141-144

ABSTRACT: This paper reports on the first-time propagation of WYLV by Schizaphis graminum after feeding on diseased wheat plants. From the only table in the paper (showing the experimental results of disease propagation), the infection rates are seen to be different for WYLV and BYDV (on wheat) with different time durations of feeding on diseased plants and viral transmission. For a duration of 4 to 5 hours, 80 to 90 percent are WYLV-infected plants while only 4 to 6 percent are BYDV-infected plants. For the time duration of 24 hours, the percentages are 16 to 38 for WYLV-infected plants, and 44 to 82 for BYDV-infected plants. Thus, the WYLV can be isolated by shortening the time duration for feeding and propagating the diseased plant to Schizaphis graminum. This phenomenon indicates that WYLV is of the semi-persistent type. The authors are grateful to associate professor Wei Ningsheng [7614 1380 3932] for his revision of the paper; and to Dr. Lister of Purdue University for supplying P-PAV antiserum.

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